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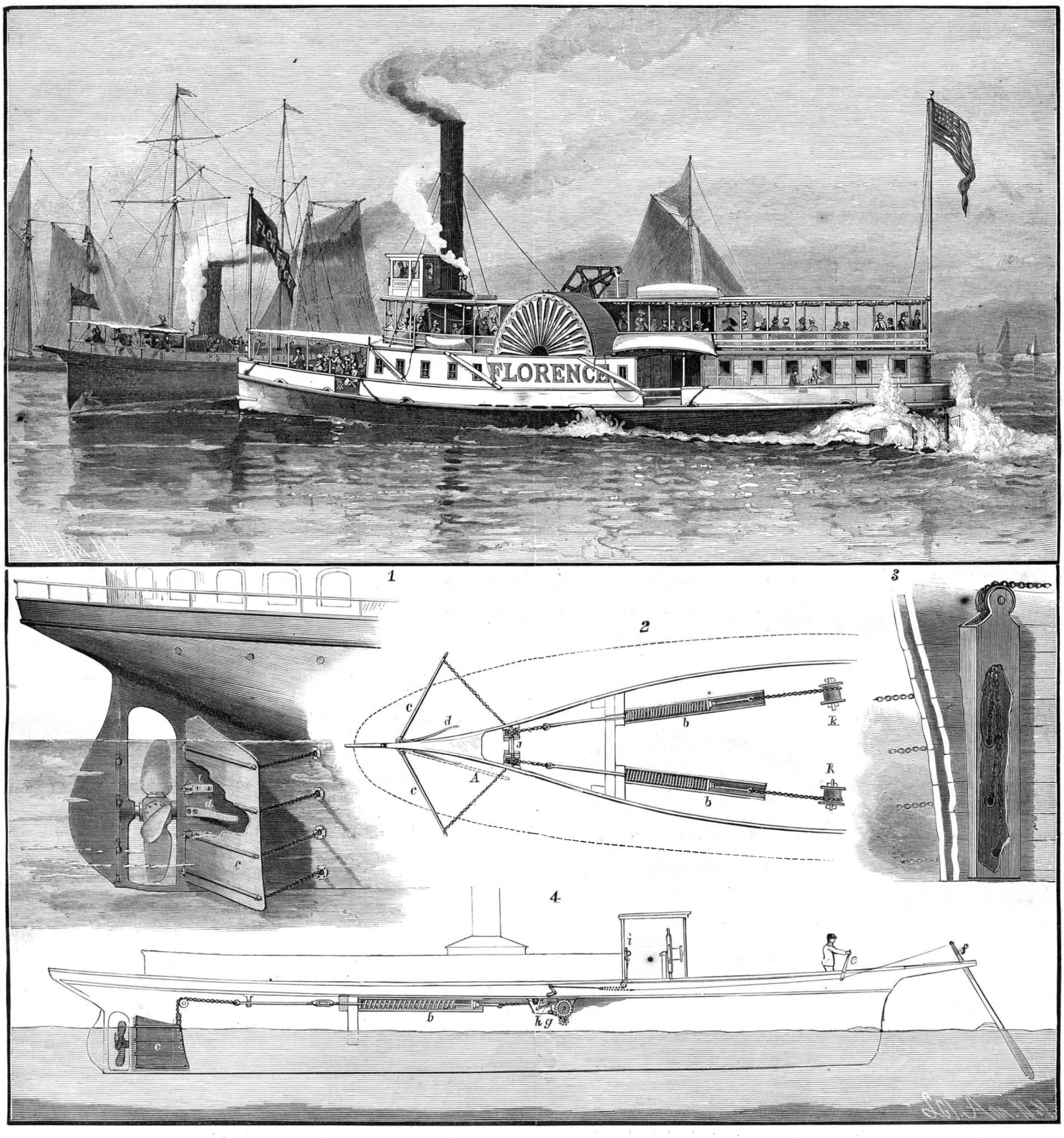
MACADAMSFINS.

A DEVICE FOR INSTANTLY STOPPING VESSELS WHEN UNDER FULL HEADWAY.

For several months past, there has been in daily practical operation in this harbor a remarkable invention, in fact, we may say, one of the greatest inventions of modern times, whether regarded from its humanitarian or its commercial aspect. An invention destined to have an immediate universal adoption, giving a new impulse to commerce, adding new elements of safety to navigation, putting an end, to a very large extent, to those appalling sacrifices of life and property upon the water, which from the earliest times have distressed mankind; to remedy which the most strenuous efforts of the ablest inventors and engineers have, until now, been exerted in vain.

The invention to which we allude is the Macadamsfins, invented by John McAdams, of Brooklyn, N. Y.; a device whereby vessels under full headway may be stopped almost instantly, independent of their motive power; it acts far more quickly and effectively to stop the vessel, than does the most powerful air brake act upon the railway train. Within the past hundred years, sailing ships have been vastly improved in size and rigging; since the art of steam navigation has been discovered, magnificent and powerful vessels, such as

(*Continued on page* 165.)



EXPLANATION.—Fig. 1 is a side elevation of the stern of the boat, and Fig. 2 is a plan view, both showing the fins spread out; Fig. 4 is a longitudinal section, and Fig. 3 shows the eye holes in the side of the vessel through which the chains pass. To the free edges of the fins, *c c*, are attached chains which are led through proper eye holes, and connected with chains extending to the windlasses, *k k*, which are locked by pawls, *h*, which may be released either from the pilot house, *i*, or the bow, *e*, or may be automatically released when the spar, *f*, projecting from the bow of the vessel, touches an obstruction. This spar is intended to be removable, and to be put in position only when approaching a coast or harbor in a fog. When the windlasses are released, the springs, *d*, open the fins sufficiently far to permit the water to gain a hold and force the fins fully open. All jar or concussion that would accompany the opening of the fins is prevented by the springs, *b*, through which pass rods that form part of the chains. The plate, *j*, connects the sides, and serves to resist the outward pull of the chains.

MACADAMSFINS—A DEVICE FOR INSTANTLY STOPPING VESSELS WHEN UNDER FULL HEADWAY.

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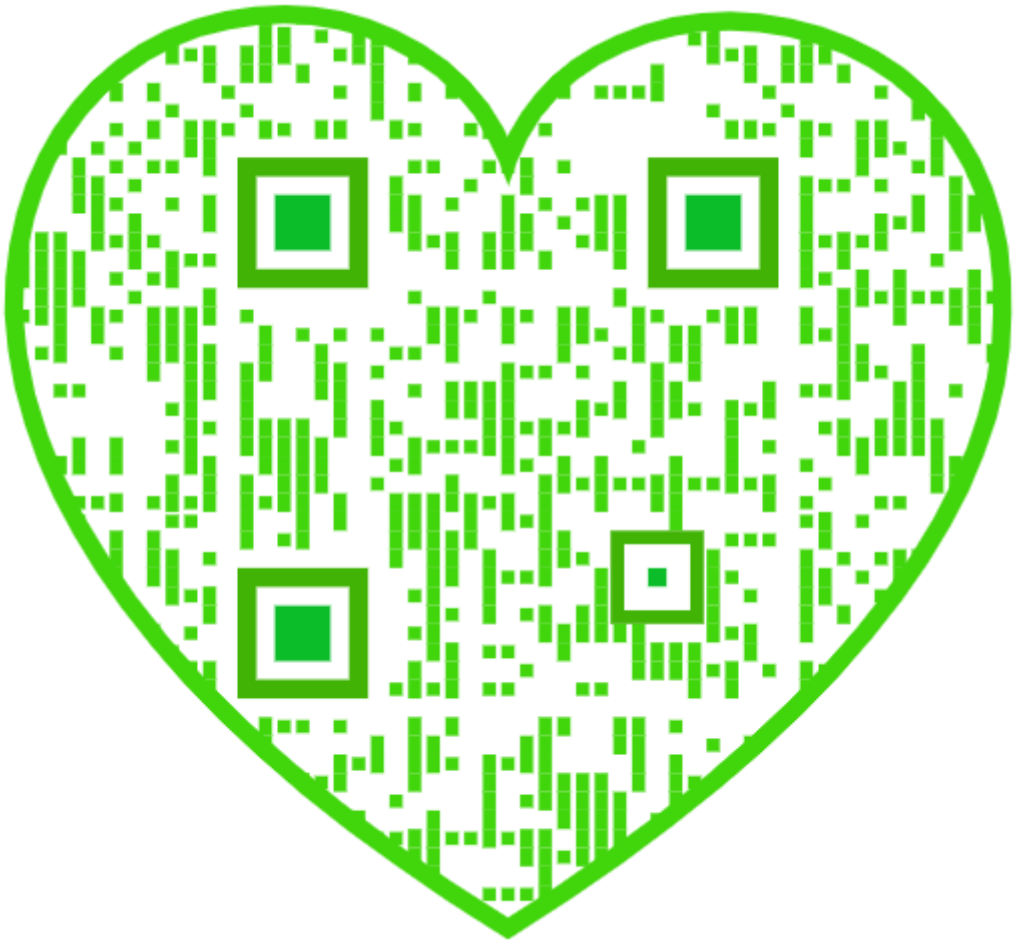

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NEW YORK, SATURDAY, SEPTEMBER 11, 1886.

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PRACTICAL APPLICATION OF LEIDENFROST'S DROPS.

The following elegant process in chemical analysis is in the line of the suggestions contained in an article translated from *La Nature*, and published in one of our recent issues. In a preceding issue the phenomena of the spheroidal state, as exemplified by Leidenfrost's drops, were described, with an illustration of the same. This will be found of interest in connection with the translation below.*

Water, placed upon a red hot metallic plate, springs into the form of a drop, and evaporates without coming in contact with the plate, as is known to all. It is equally well known that by using a concave vessel the drop continually rotates. To Bohlig belongs the credit of suggesting the practical use of the Leidenfrost experiment, more especially in water analysis for determining the solid residue of natural water.

Where hitherto this determination has been effected by evaporating the water to dryness without boiling, in a platinum dish on a sand or water bath, and afterward weighing the already tared dish, Bohlig proceeds as follows: He brings a shallow platinum dish to a bright red heat over a gas lamp, measures out 50 c. c. of the water to be analyzed, and by means of a pipette lets single drops of it fall into the capsule, where they gather into a fluid globule or spheroid, which begins to rotate. The evaporation proceeds quietly, without any spurting, and new quantities of water are added drop by drop, so that the spheroid always preserves a suitable and comparatively unvarying size. The operation can be carried out successfully with little practice, and is extremely elegant and precise. It is only necessary to be sure that the vessel is kept at a red heat, and that too many drops are not added nor in too rapid succession, as otherwise the sudden cooling would cause a spurting of the fluid. Too rapid a rotation of the globule is prevented by letting the next drops, when it is time to add them, fall in a direction opposed to that of its rotation, so as to keep its movement in check. When the 50 c. cm. of water are in the capsule, the operation is soon ended, the globule rapidly grows smaller, darker in color, until it resembles a pea, the rotation slackens, and eventually ceases. The flame is then removed.

The globule of residue lies perfectly loose on the capsule, without showing any adhesion. Thus there is obtained the solid residue of 50 c. cm. of water, which has been evaporated without contact with the sides of a vessel, without loss, and without contaminating mixture, in the shape of a little globule, which is exposed for a good while to a temperature of 180° C., until dry, and then is rolled directly upon the scale pan of a chemical balance, and weighed within ½ milligramme.

The advantages of Bohlig's method may be thus summarized. The residue is in the shape of a little bead, with so small a superficies that, even if it contains chloride of calcium or chloride of magnesium, the absorption of water from the air is almost nothing, especially as the time of exposure is soon over on account of the small weight to be weighed. Moreover, there is nothing to prevent the weighing of the globule in an air-tight, closed tube, well dried beforehand.

It is unquestionable that this new method can be adopted for the evaporation of all sorts of fluids to dryness, without loss and for a large class of cases, if one includes different modifications of the method. For example, the platinum may be replaced with equal or greater advantage by silver, copper, or even pure nickel, and the method is not limited merely to solutions in water. There is no true contact of the fluid to be evaporated with the sides of the vessel, so that no chemical action can affect them. Hence aqua regia, sulphur compounds, etc., can be treated in red hot silver vessels without the latter being at all attacked. —*Rundschau fur Pharmacie, from Ph. Centralhalle.*

* See SCIENTIFIC AMERICAN, vol. liv., No. 26, p. 404, and vol. lv., No. 2, p. 16.

OUT OF WORK.

Doing nothing and doing evil are sometimes almost synonymous. A man whose habit is work finds idling at home a very distasteful method of passing the time, and he gravitates to the social knot of acquaintances, whether they are on the street corner, in the grocery, or in the saloon. He may be a member of some trades union, and his obligations to the society prohibit him from working at his trade; but if he is a family man, he can find work that will be unprohibited and useful, without going from his own door. No allusion is made to the more laborious portions of the housewife's work, although there is opportunity here for grateful and proper assistance.

But an observant eye can find a number of little jobs to do that will make home pleasanter and increase the conveniences of housework. To illustrate from fact. A worker found himself suddenly shut off from his daily earnings, but he did not seek other involuntary idlers like himself to bewail the ill fortune. He looked at home for something to do, and found it. Several of the mortise locks on the doors refused to catch their bolts. He took them out, and found broken wire spiral springs. For these he substituted bits of rubber, and made the locks better than before. He washered the knobs of the doors that had a rattling play whenever handled. He put new thresholds and storm guards to outer doors which had admitted a flood to the front hall and to the kitchen whenever the rain was from east or south. He tightened rattling windows, and where the upper and lower sashes met he placed flat strips of wood covered with woolen cloth on one side and edge; this kept out a deal of cold wind. The stove top was not large enough to hold utensils in cooking in addition to others just lifted off. He went to a building in process of erection, and was given four pressed bricks. He made a frame to hold these side by side, and placed it alongside the stove. His wife considered it a great convenience. Several shelves were placed where they would do the most good. He fixed a piece, holding a number of pivoted arms, to the wall back of the stove, and the good woman had a handy drying horse for dish wipers, towels, and other small articles, and the bars, when empty, could be swung against the wall out of the way. The little girl had dolls and other playthings to be mended, there were chairs with broken backs and loose rungs which required dowel and glue, and a table with rickety legs, and one with a leaf hinge rotted through by rust. Tubs and pails were in danger of coming to pieces for want of hoops. He made better hoops of wire than the original ones of paper-thin iron. As cold weather was coming, he hung a door to the pig's sleeping place, a door double hinged with leather at the top, so as to swing both ways, and when released to hang vertical.

There was scant closet room in the house, but in the kitchen was a space between a corner and a window where a good sized cupboard could be placed. The idle mechanic, but busy man of family, constructed a "dresser," as he called it, which, after a year's use, his wife said was the handiest piece of furniture in the house. It was 5 feet long by 3 feet wide, having a table of these dimensions, directly under which were two drawers, running on strips furnished with rolls, for the drawers were nearly 3 feet by 2 feet 6 inches and 8 inches deep. Under these drawers were two cupboards, side by side, one furnished with shelves. The sides of the dresser extended above the table, at the back, of a width of about 8 inches, and high enough to receive 3 shelves. The contents of these shelves could be covered by curtains sliding by rings on a brass wire. Apart from labor, this piece of furniture cost less than two dollars.

This instance of useful home employment in a case of enforced idleness is cited merely as a suggestion; but many of these little jobs need not await a strike or other compulsory withdrawal from ordinary work; they are appropriate for evenings and otherwise unused holidays. There is usually some one thing or another "out of kilter" in the house, and this fact has been so far recognized that in a Western city there has been organized a jack-at-all-trades industry that makes contracts to keep houses in repair, and does all sorts of household call jobs, from mending a leaky roof to setting a pane of glass, from hanging a new door to repairing a broken lock, and it is said that the hands are never out of employment.

A Bell Five Hundred Years Old.

The city of Breslau lately celebrated the 500th anniversary of an occurrence which was memorable in the history of the town, and is known wherever German poetry finds a home. The bell which hangs in the southern tower of St. Mary Magdalen's church, and is named "St. Mary's bell," but is usually known as "the poor sinners' bell," rang out morning and evening on the 17th of July to remind all who heard it that it was cast on that day 500 years ago. Next day, Sunday, the preacher reminded his congregation of the pathetic story which has made it singular among bells—how, when all was ready for the casting, the bell founder withdrew for a few moments, leaving a boy in charge of the furnace, warning him not to meddle with the catch that secured the seething metal in the caldron. But the boy disregarded the caution, and then, terrified on seeing the molten metal beginning to flow into the mould, called to the bell founder for help. Rushing in and seeing what he had intended to be his masterpiece ruined, as he thought, angered to madness, he slew the boy on the spot. When the metal had cooled and the mould was opened, the bell was found to be an exquisite work, perfect in finish, and of marvelous sweetness of tone. Coming to his senses, he recognized his bloody work, and straigthway gave himself up to the magistrates. "Blood for blood" was the law; he was condemned to die, and he went to his doom while his beautiful bell pealed an invitation to all to pray for "the poor sinner," whence its name. W. Muller has enshrined the sad story in a ballad of touching simplicity:

"War einst ein Glockengieszer
Zu Breslau in der Stadt."

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NIGHT SKY—AUGUST AND SEPTEMBER.

BY RICHARD A. PROCTOR.

The Great Bear (*Ursa Major*) is low down, between northwest and north, the Pointers (α and β) directed slantingly upward toward the Pole. A line from the Pole Star, α of the Little Bear (*Ursa Minor*), to the Guardians of the Pole, β and γ, is in the position of the minute hand of a clock twelve minutes before an hour. Between the Great Bear and the Little Bear run the stars of the Dragon (*Draco*), round the Little Bear toward the north, thence toward the northwest, where we see the head of the Dragon high up, its two bright eyes, β and γ, directed toward *Hercules*, which occupies the western midheaven. Above Hercules is *Lyra*, the Lyre, with the bright steel-blue star Vega high up toward the point overhead. Right overhead is the Swan (*Cygnus*).

Low down in the northwest we see in the chart one star of the Hunting Dogs (*Canes Venatici*). Nearer the west stands the Herdsman, rather slanting forward, however, with the Crown (*Corona Borealis*) on his left, almost due west. The long winding Serpent (*Serpens*) runs from near the Crown, where we see its head due west to farther south than southwest, high up, on the western side of the Serpent Holder (*Serpentarius* or *Ophiuchus*), now standing upright in the southwest. Low down creeps the Scorpion (*Scorpio*), its heart Antares, rival of Mars, in the southwest, the end of its tail between south and southwest. Above and south of the Scorpion's tail we see the Archer (*Sagittarius*).

Due south, and high up, is the Eagle (*Aquila*), its tail at ζ and ε, its head at θ, the bright steel-blue Altair marking its body. On the left, or east, of the Eagle lies the neat little Dolphin (*Delphinus*). Midway between the Dolphin and the horizon is the tip of the tail of the Sea Goat (*Capricornus*), whose head lies nearly due south.

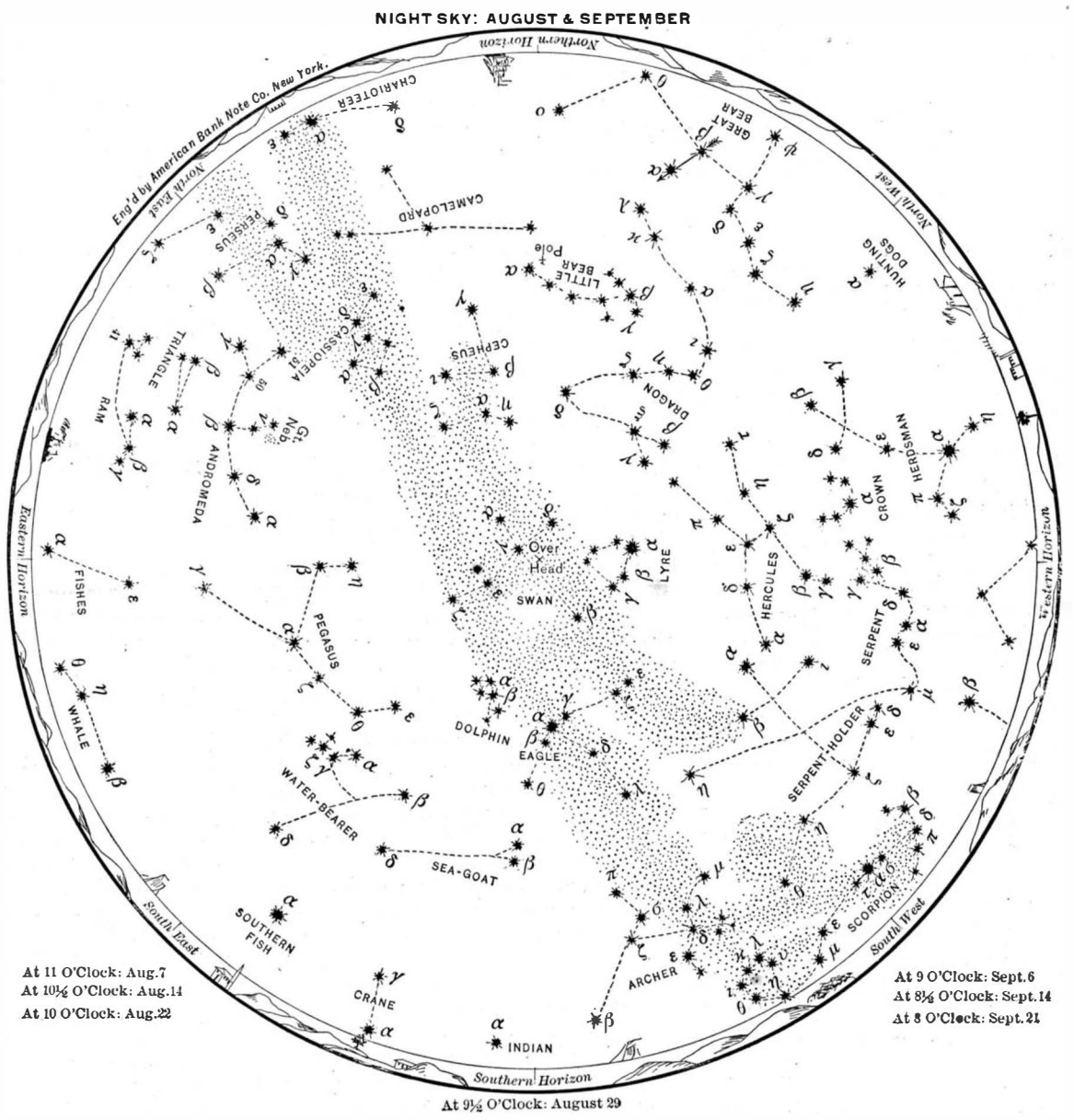
On the southern horizon is the head of the Indian (*Indus*); on its left a part of the Crane (*Grus*); and low down in the southeast lies Fomalhaut, the chief brilliant of the Southern Fish (*Piscis Australis*). Above lies the Water Bearer (*Aquarius*), in the southwestern midheaven.

Due east, fairly high, is "the Square of Pegasus," the head of the Winged Horse, Pegasus lying close by the Water Pitcher of Aquarius (marked by the stars ζ, γ, and α).

The Fishes (*Pisces*) are low down in the east, a few stars of the Whale (*Cetus*) being seen on their right, very low down. On the left of Pisces we see the Ram (*Aries*), low down; above it the Triangle; and above that the Chained Lady (*Andromeda*).

Low down in the northeast is the Rescuing Knight (*Perseus*); above whom is *Cassiopeia;* and on her left, higher up, the inconspicuous constellation *Cepheus*.

Lastly, immediately below Cepheus, we find the Camelopard, below which, very low down, between north and northeast, is the Charioteer (*Auriga*), the brilliant Capella being just above the horizon.



In the map, stars of the first magnitude are eight-pointed; second magnitude, six-pointed; third magnitude, five-pointed; fourth magnitude (a few), four-pointed; fifth magnitude (very few), three-pointed, counting the points only as shown in the solid outline, without the intermediate lines signifying star rays.

The Earthquake of August 31 and September 1.

As we go to press, the accounts which have reached us of the great earthquake are not reliable enough to justify the full discussion of the great catastrophe. Affecting the continent over an area extending from the extreme southeastern States to the great lakes, and by its shock alone, without any tidal wave, wrecking so many buildings in Charleston, we may hope that it will for many years retain its present pre-eminence as one of the great earthquakes of this country. Disturbances are recorded in no less than twenty-eight States of the Union.

In the city of Charleston, S. C., on August 31, between 9 and 10 P. M., the first and most destructive shock occurred. According to one account, there were three disturbances within half an hour. The clocks in the steeples stopped a little before 10 P. M. Then all was quiet until Sept. 1, from which day disturbances are recorded extending from 2 A. M. to 11:50 P. M., six in number, followed by two light shocks at 1 A. M. and 5 A. M. on Sept. 2. This gives a total of eleven more or less accurately verified shocks. A few light shocks have since been reported. The damage was done during the first hour. It was very great, but original estimates have been greatly reduced, both as regards the loss of life and of property. The present estimate places the mortuary record at 50 to 60 lives. The property loss is considered to be about $3,000,000.

Three or four buildings are in complete ruin, a number of other buildings have had their fronts prostrated. Many of the public buildings, Hibernia Hall, St. Michael's and St. Philip's Church, have been so cracked that their repair will involve little short of demolition. Ceilings were thrown down, chimneys overturned, and coping stones and gables suffered. Fire added its horrors to the scene, and some twenty houses were burned. The shock broke the water pipe leading to the high-level stand-pipe, so that water had to be pumped directly into the mains for a while, until that connection was restored. The reservoir suffered no injury whatever.

The negroes in some cases were greatly excited. The main portion of the populace seem however, to have acted well. They generally adopted the plan of camping out on vacant lots, or in the yards of their dwellings. By noon of September 2, the people seemed to recover themselves and began to take possession of their houses. The papers suspended publication. In the Western Union Telegraph office, instruments and batteries were destroyed by the falling debris, so that telegraphic communication was interrupted. The railroads stopped running, the first train from Charleston reaching Savannah on the afternoon of Sept. 2. Reports of the shock have been received from other cities over an immense area, extending from New Haven to Detroit and Chicago, and thence over the area to and including the Southern coast States.

Many peculiar phenomena are reported. A railroad train was thrown into violent oscillation, and ran through the period of the shock before the cars could be stopped. On some of the roads, rails are reported as bent.

In various places in the neighborhood of Charleston fissures were produced and symptoms of geyser action were manifested. Eruptions of different colored muds and sands mixed with water occurred in many localities. The accounts as received remind us of the Western mud geysers. Some of the matter thus thrown to the surface is naturally reported to be of kind unseen before. The erupted water and the air in places are said to have smelt of sulphur. The water in the wells is said to have fluctuated in level during the shocks, and to have had its level raised permanently. Jets of water are reported to have been thrown from the fissures.

While the shock in the city of Charleston did so much damage, instances of immunity are to be also recorded. In one large block of stores most of the plate glass escaped, though bricks and parapets were disturbed. The Belgian pavement was not affected. Some of the larger buildings, the Academy of Music, the Waverley and the Victoria Hotels are reported uninjured externally.

The cause of earthquakes, like that of geysers and of volcanoes, is a mystery. The very high specific gravity of the earth makes its interior composition quite uncertain, and assimilates it to that of meteorites. If in a liquid state, the enormous compression it is subjected to by gravity would probably modify its rigidity somewhat. Even if the earth is solid, but hot, as is probably the case, and is continually cooling, then in the shrinking of the crust we could find a force powerful enough to cause the most intense of earthquake disturbances, if it were rightly directed. The present way of treating the subject is to assume a subterranean shock given at a place which is called the focus. This is supposed to be subterranean, and to vary in its depth below the surface, as a maximum being thirty miles. From this focus two series of waves emanate—one longitudinal, resembling sound waves, and of rapid motion of translation. They are accompanied by the slower lateral waves, resembling the waves of water. It is the longitudinal waves that produce the principal results, the others being of little account. The amplitude of waves that cause damage may be very slight. An oscillation in the earth's surface of 2½ inches amplitude will crack masonry.

These considerations bring the subject within the scope of mathematical treatment, but leave the ultimate cause as great a mystery as ever. If a cause for the initial shock can be formulated, then the theory will be complete.

Remembering how slight a settlement will crack masonry, and how very inelastic brickwork is, we have no trouble in finding the cause of the great injury to property. It lies, to a great extent, in the nature of the buildings themselves. The least oscillation will disturb plaster, and will crack brick walls. What we seem forced to do to meet the demands of our modern civilization is to put up structures that are most fragile as regards any earth movement. The earthquake represents generally a comparatively insignificant movement of the earth's surface, but the unyielding nature of the building material causes it to break on all sides. Furthermore, it is to be observed that the last intelligence reports the more substantial buildings as standing intact and uninjured, showing how much the fragile character of the erections had to do with their demolition.

The city is now reported as showing signs of great activity, and the inhabitants seem to have met the disaster in a manner worthy of their established reputation for courage under disaster, proved so severely by the tidal wave of last year and on other occasions.

In Peru, earthquakes are very frequent, while rain is of the rarest occurrence. Her houses are strong enough to resist a whole series of moderate earthquakes, but are far from water-tight. A few years ago a rain storm occurred, to the greatest consternation of the native populace. They were fully as frightened as we would be by what, to us, is the more unfamiliar terrestrial visitor. When all was over and the rain ceased, it was found that the damage to furniture and property by leakage of the roofs was very great. The rain storm had done more harm than had many years of earthquakes.

A WHITE swallow was shot recently near North Haven, Conn. It was a perfect albino, pink eyes, and all.

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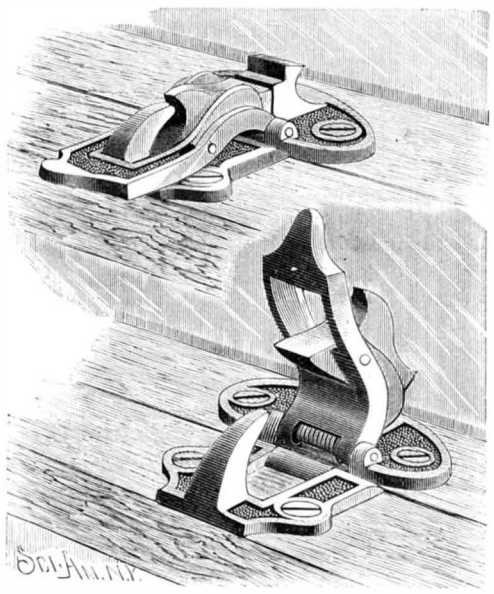
SASH FASTENER.

The plate attached to the upper bar of the lower sash of the window is made with a curved, upwardly projecting horn. Upon the plate attached to the lower cross bar of the upper sash is a locking stud, in front of which is pivoted a locking hasp, which is acted upon by a spring to normally hold it in a horizontal position, to engage with the horn for locking the sashes together. Pivoted in the hasp is a dog that acts in connection with the locking stud for locking the sashes. When in the position shown in the lower view, the toe of the dog stands in front of the curved surface of the



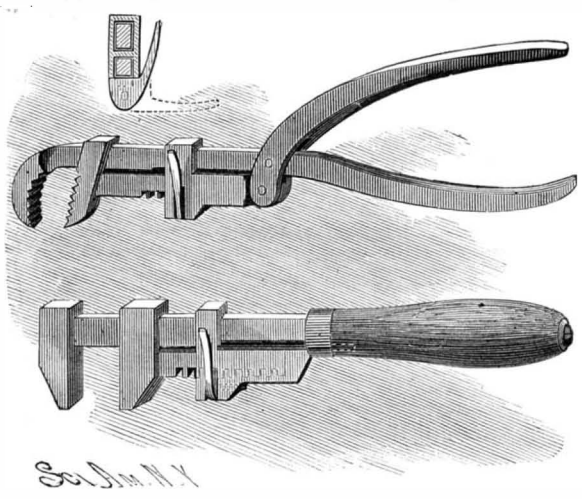
DAVIS' SASH FASTENER.

hasp and in line with a lip on the other bed plate, so that in closing the sash when the lip strikes the toe, it turns the dog on its pivot and detaches it from the shoulder of the locking stud. This permits the spring to force the hasp and dog forward, so that the hasp will drop over the horn and the dog into engagement with the locking stud, and thus automatically lock the sashes. To unlock the sashes, the dog is turned backward and the hasp raised at the same time, and turned backward on its pivot to engage the dog with the stud where it will be held. This fastener is effective and reliable, and requires no attention in locking the window.

This invention has been patented by Mr. Franklin T. Davis, of Mount Vernon, N. Y.

IMPROVED WRENCH.

The pipe wrench shown in the two upper drawings is made with a long bar, having its forward end turned over and serrated to form the fixed jaw. To the bar is pivoted a lever, the long arm of which, together with the back end of the main bar, forms the handle of the tool. To the outer end of the short arm of the lever is pivoted the back end of a metal box having two parallel longitudinal slots, through one of which the bar passes, while in the other fits the shank of a ⊢ bar, whose serrated head is slotted for the passage of the main bar. The outer edge of the shank is formed with notches, any one of which, as the shank is moved endwise in the box, may be engaged by a pawl lever arranged as shown. When the stem of the pawl lever is thrown out, as shown by the dotted lines in the upper view, the shank and its movable jaw may be slipped along to separate the jaws, so as to admit the pipe. The pawl lever is then swung to the position indicated by the full lines, when the jaw bar is locked to the box. As the handle lever is swung toward the main bar, the box and jaw bar will be moved forward to firmly clasp the pipe. It will be seen that this tool is easily adjusted, and may be quickly operated. In the modification shown in the lower view, the same principle is applied to a monkey wrench. In this case the box is immovable endwise, but the jaw bar may be set and locked at any desired position on the main bar.



DEAN'S IMPROVED WRENCH.

This invention has been patented by Mr. James B. Dean, of Stockton, N. J.

Forty Knot Ships.

Prof. Chas. F. Hurst, of the College of Practical Engineering, Chiswick, England, says:

If it be the case, as according to Reech's law it confessedly is, that by increasing the linear dimensions of a steamer four times, with a proportionate increase of power, we get twice the original speed, and if, further, it be the fact, as it also confessedly is, that many torpedo boats realize a speed of over 20 knots, then it is plain that we have only to enlarge one of these torpedo boats four times in every direction to get the 40 knots we require. Nobody can pretend that such an enlarged torpedo boat cannot be built, and with these points of knowledge before the public, the onus manifestly lies upon those who deny the practicability of attaining 40 knots to specify wherein lies the impediment to its realization. If we accept Reech's law, then, so far as I am aware, the only objection of the least plausibility that has yet been mooted is, that whereas the strength of the working parts of engines increases simply as their sectional area, while the momentum strain put upon them by excessive speeds increases as the square of the velocity, the momentum strain at very high speeds may so far outrun the strength that some of the parts will give way. To this the simple answer is, that it is not proposed in these engines, more than in any other engines, to employ such excessive speeds as could lead to any such result, and in my last letter I specified several engines, which had been working for years without accident, with a considerably larger momentum strain upon them than I should be disposed to permit.

I have already shown that up to such speeds as I propose to employ, the effect of the inertia or momentum of the working parts will be to equalize strains, and therefore to reduce rather than to augment those which are most considerable. No doubt we have not any vessels yet working at a speed of 40 knots through the water, but we have innumerable examples of engines in all parts of the world running at this speed on railways, and it signifies nothing to an engine, so far as its strength is concerned, whether the resistance it has to surmount is situated on the land or on the sea.

The accuracy of Reech's law as a measure of the resistance of vessels has long been recognized on the Continent, and has also been conclusively demonstrated in this country by the late Mr. Froude. At page 5 of his obituary memoir given in the "Minutes of Proceedings" of the Institution of Civil Engineers for 1870–80, Part II., the following remarks will be found on this subject:

"Mr. Froude's first step in connection with his inquiries touching the resistance of ships was to enunciate the true principle of the relation of the resistance of a ship to her model, namely, that the resistance is in the proportion of the cube of a linear dimension—in other words, as her bulk—at speeds proportionate to the square root of the linear dimension. He demonstrated this mathematically, and by experiments with different sized models, some of which were nearly half a ton in displacement."

If we take a torpedo boat as the model, then a vessel four times larger in each linear dimension will be four times the length, four times the breadth, and four times the depth; while her capacity will be 4^3, or 64 times, her displacement 64 times, and her engine power 64 times; but with these proportions her speed will be $\sqrt{4} = 2$ times greater, or if the speed of the smaller vessel be 20 knots, then that of the larger vessel will be 40 knots. In vol. xxxix. of the British Association Reports for 1869, pp. 43 to 47, and in various recent tracts and papers by Mr. Froude, ample information in regard to the accuracy and applicability of Reech's law is afforded.

If Reech's law be correct, it follows as a necessary consequence that by the introduction of the specified power, a speed of 40 knots will be practically obtained; and this power may be introduced without employing such a speed of engine as would jeopardize its strength and safety, or be otherwise inconvenient in any respect.

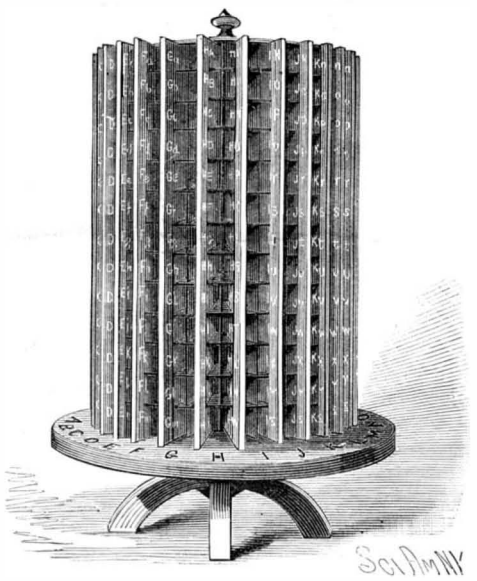
We suggest to the Wall Street schemers that they form a company for the building of a 40 knot boat. Such a vessel, running between New York and Albany, would beat the railway, and enjoy an immense patronage.

Magnetic Clock.

A curious application of the magnet is described in a French journal, the subject of it being a clock recently patented in France. In appearance the clock consists of a tambourine, on the parchment head of which is painted a circle of flowers, corresponding to the hour signs of ordinary dials. On examination, two bees, one large and the other small, are discovered crawling among the flowers. The small bee runs rapidly from one to the other, completing the circle in an hour; while the large one takes twelve hours to finish the circuit. The parchment membrane is unbroken, and the bees are simply laid upon it; but two magnets, connected with the clockwork inside the tambourine, move just under the membrane, and the insects, which are of iron, follow them.

FILE STAND.

The object of this invention, which has been patented by Mr. Erskine D. Parsons, of Kansas City, Mo., is to provide a file stand so constructed as to afford easy access to the pigeon holes and ready reference to the matter placed therein. The body portion of the file stand is pivoted, so that it may be revolved, and is provided with pigeon holes, radiating from the outer edges of which are plates, upon both surfaces of each of which are formed indexes corresponding with the series of the pigeon holes, which are preferably arranged so that two sets will come between each pair of flanges. Opposite

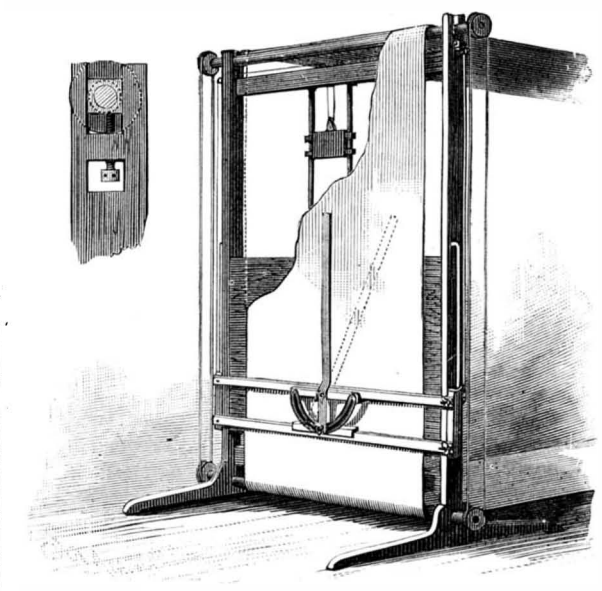


PARSONS' FILE STAND.

each pair of flanges is an index letter, upon the upper surface of the base board, so that these letters indicate the vertical series of holes, while the vertical indexes indicate the holes in each series. As the flanges separate the vertical series of holes, only one set will stand before the user at once, thereby preventing confusion, and avoiding, to a great extent, danger of mistake in filing away matter.

DRAWING APPARATUS.

This apparatus consists of a frame provided with a stationary drawing board, of a movable counterbalanced T square, and of rollers on which an endless sheet of drawing paper is mounted. Each of the bearings of the upper roller is adjustable in a slot, formed in the upper part of each standard, by means of a set screw, as shown in the small view, so that the drawing paper can always be held in a stretched position on the board which connects the standards. The shafts of the rollers are provided with pulleys, over which pass endless cords, by pulling which the paper may be moved up or down. On the outer side of each standard is a guide rod, on which is mounted a slide, to which the T square is attached. Secured to each slide is a cord, which is led over guide rollers to a counter weight. The T square slides in two horizontal straight edges. With the aid of the straight edges, horizontal lines may be drawn; and with the swinging



FERON'S DRAWING APPARATUS.

straight edge (the construction of which is clearly shown in the center of the large view), which can be moved laterally on the straight edges, vertical or diagonal lines may be drawn. With this apparatus, the operator can make drawings on paper of considerable length without moving from the board.

This invention has been patented by Mr. Arthur C. Feron, whose address is care of Pottier & Stymus, corner 41st Street and Lexington Avenue, New York city.

HENRY O'REILLY, one of the pioneers in the establishment of the telegraph, died at Rochester, N. Y., on August 17, aged 80 years.

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THE WATER WORKS OF PARIS.

The hall that attracts the most attention at the Exposition of City Hygiene is the one in which is exhibited the various apparatus used in connection with the public water supply of Paris.

One's attention is first struck by a large aquarium surmounting a reservoir, into the three compartments of each of which are directly led, by special conduits, the waters of the Ourcq, Vanne, and Seine.

The flow is continuous, and the water is constantly being renewed; so it is very easy to obtain an idea of the comparative purity of the waters of the three sources named. This ingenious arrangement is shown in Fig. 1. The very different and well defined tints of these three waters may be very clearly distinguished in the aquarium; but it is especially in the compartments of the reservoir, which are painted white internally, and which are about seven feet deep, that the difference is most manifest. The water of the Ourcq looks like pea soup; that of the Vanne is of an azure blue, reminding one of the color of the Swiss lakes; and that of the Seine is of a yellowish gray. One cannot leave this spectacle without having a very accurate idea of the comparative value of the waters that are used for public and private purposes in Paris. It is pleasing to think that those who have the administration of the city in charge will hereafter endeavor to furnish spring water exclusively for private consumption, and that they will not long defer substituting this for the impure water of the Seine and Ourcq, the aspect of which is so repulsive, and which unfortunately constitutes a large part of the public supply.

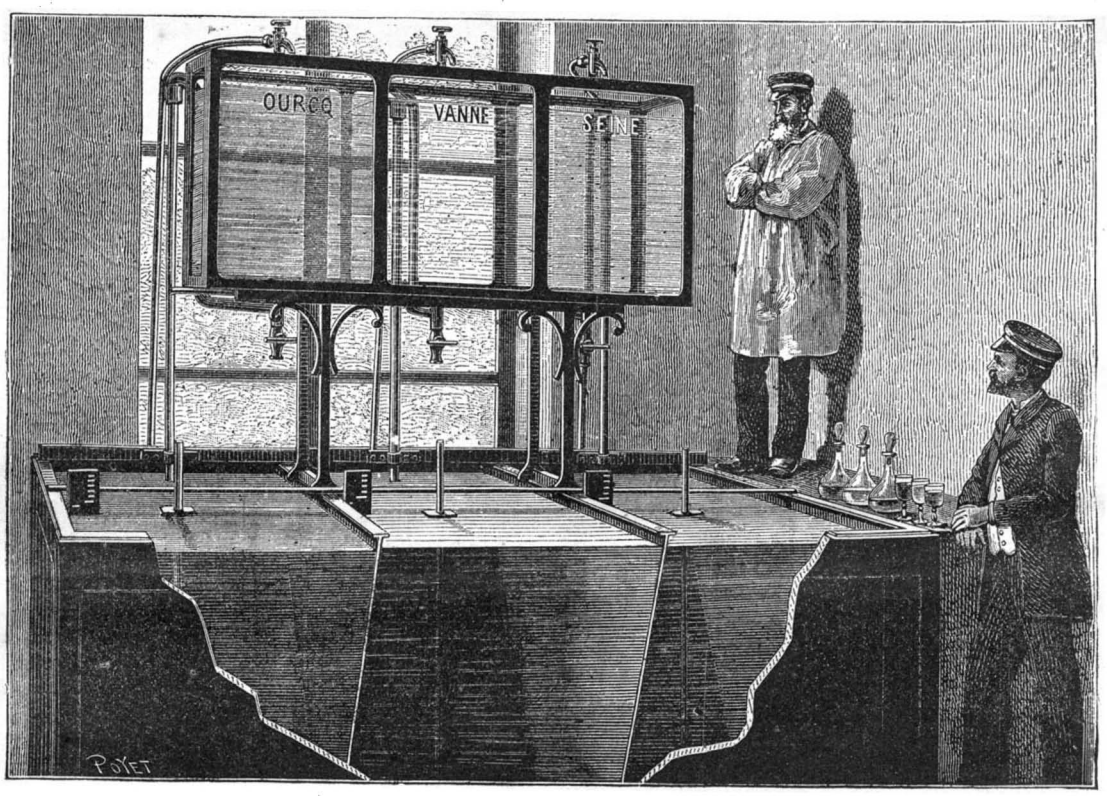

Fig. 1.—AQUARIUM SHOWING THE COMPARATIVE TRANSPARENCY OF THE WATERS OF THE OURCQ, VANNE AND SEINE.

The water works of Paris comprise two services—a public one for streets and kitchens, and a private one for houses. Mr. Belgrand, as long ago as the time when the great works connected with the water supply were begun, demonstrated that, on the one hand, in view of the decreasing purity of most of the river waters and the increasing exigencies of the public, nothing definite would be effected at Paris if spring water were not served for domestic purposes; and that, on the other hand, at the distance Paris is situated from high altitudes, it would be ruinous, if not impracticable, to introduce enough spring water for the needs of the public service, which, moreover, would not utilize its qualities. A division of the service, moreover, was rendered necessary by the height of Parisian houses. The great extent of the street service causes the pressure to fall several times a day in the mains, so that the supply is cut off from the upper stories, and that it is necessary to have recourse to the water of the private service, without which, at certain hours, elevators would come to a standstill during their trip, and the stream from the nozzles of fire engines would not reach the roofs of houses.

Water for the private service is derived from the Dhuis and Vanne, whose sources were selected as being among the purest of those of the Paris basin. The water is collected with the greatest care, and stored in reservoirs surmounted by terre-pleins carpeted with turf. Closed aqueducts of ovoid or circular section, provided with manholes, keep this water in such a state of aeration and coolness that, after a flow of forty-eight hours, it reaches Paris just as it was collected, and without having varied more than one degree in temperature. As for the public supply, that is obtained, through the Ourcq canal, from the Seine, the water of which is pumped up by six establishments run by steam; from the Marne, the water of which is pumped up by the Saint Maur works; and from artesian wells. As we have stated, the aquarium and reservoir at the exposition show the incontestable superiority of spring water. That of the Dhuis and Vanne is, in fact, perfectly limpid and slightly calcareous, is excellent for all purposes, and its mean temperature allows it to be introduced into dwellings in a highly appreciated state of coolness. Dr. Miquel finds in it but 62 germs against 2,000 in the Seine water; and Mr. Albert Levy has shown that in the water of the Vanne, preserved for two days, the oxygen persists or increases, while in the water of the Seine it diminishes, this being a sure sign of the presence of animalcules in the latter. It is not the same with river water and that of the Ourcq. The latter marks from 30° to 40° by the hydrotimeter, that of the Marne, 19°, and that of the Seine 17°. The two last are nevertheless good enough for all the uses of the public service and for industrial purposes.

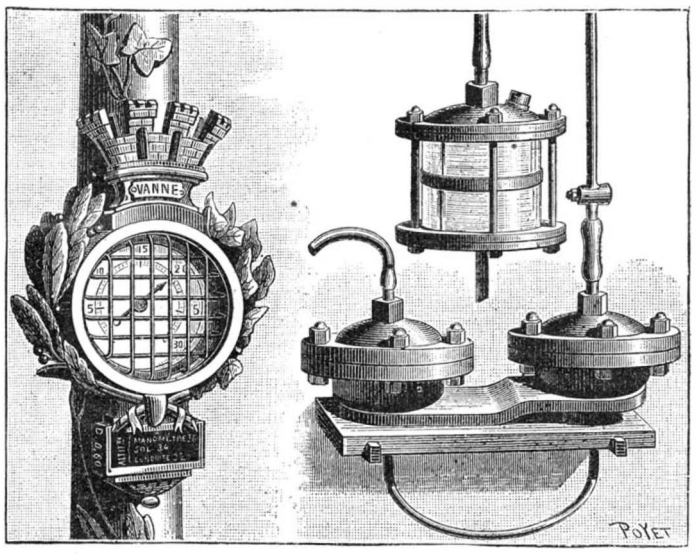

Fig. 2.—PRESSURE GAUGE FOR SHOWING LEAKAGES.

The water brought into Paris by conduits is received in 17 reservoirs, which have a total capacity of 11,655,600 cubic feet, and which are located at altitudes varying from 150 to 440 feet. All these are open except those of the Ourcq and that of the Seine at the Pantheon, so that the water may be kept limpid and cool. From these reservoirs start the distributing mains, all of which are of cast iron with ring joints. Most of these are laid in the sewers, so that they can be inspected, leakages be stopped, and junctions be effected without any digging having to be done.

The water is afterward distributed, according to its nature, by properly arranged piping. The lower part of Paris is now supplied with water from the Ourcq and Vanne; the middle part with water from the Seine and Vanne; and the upper part with that from the Dhuis and Vanne. Moreover, these various districts can come to each other's aid, the water being forced downward and upward by relay engines. In winter, the water unused by the private service is passed over to the public use. In summer, or in case of accident (but for a few days only), the Seine water pumped up at Ivry replaces that of the Vanne, and the latter, pumped up at the Villette works, replaces that of the Dhuis.

The quantity of water thus daily introduced into Paris is as follows:

Spring water (Vanne and Dhuis)	4,205,000 cub. ft.
Canal water (Ourcq)	3,880,000 "
Seine water	6,000,000 "
Marne water	2,900,000 "
	"
	16,985,000 "

Say about 48 gallons per head. In a lecture delivered by him, Mr. Bechmann has remarked that the spring water is inexhaustible, and that the supply is greater than the demand; but the above figures are averages, and on certain days, especially during the prevalence of great heat, it is a maximum that must be satisfied. There is, then, still an insufficiency, especially if we take into account the great increase that will be brought about by the suppression of privy vaults in Parisian houses. So, two years ago, excellent sources were acquired to the east and west of the city, and these alone will introduce 4,200,000 cubic feet of water marking 16° by the hydrotimeter. The projects for the introduction are all prepared, and it is reckoned that in 1889 Paris will have 230,000,000 cubic feet of water for its 2,200,000 inhabitants, or about 66 gallons per head. In 1789, a century ago, there were but 280,000 cubic feet of water to supply a population of 600,000 at Paris, say 2⅛ gallons per head; and instead of the 85 fountains to draw water from, and the 455 gratuitous and paying grants that existed at that epoch, there will be, in 1889, 17,000 public apparatus and 70,000 subscriptions. Besides, the water that was sold in the time of carriers at 5 francs is now down to 30 centimes; a household of three persons can be supplied by cock for 16·2 francs, and by meter for 20 francs per annum. In short, Paris, which was poorly supplied with water twenty years ago, and which has not yet the quantity desirable for a great capital, both elegant and industrial, is now the European city in which the public service is completest; and, moreover, it stands in the front rank as regards the quality of water supplied for domestic purposes.

This conclusion, which we borrow from Mr. Bechmann,

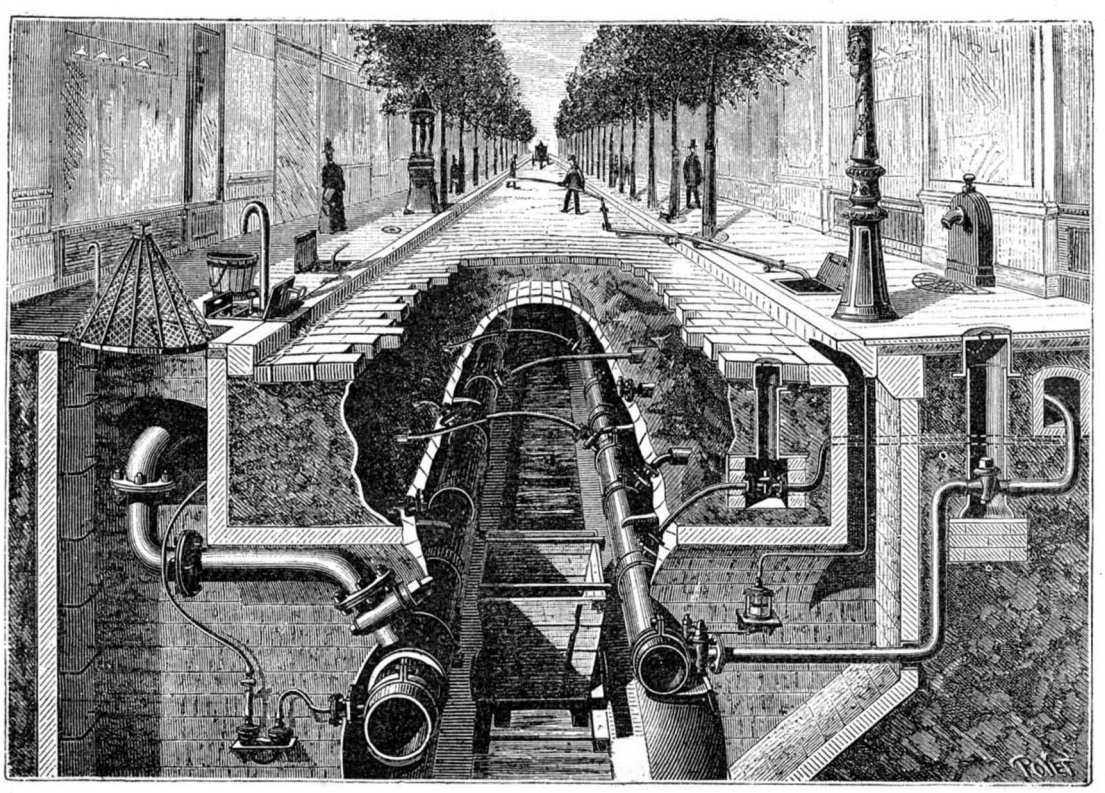

Fig. 3.—ARRANGEMENT OF WATER MAINS AND ACCESSORIES AT PARIS.

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very justly expresses the present state of the water service at Paris, and it is a justification of the efforts that he has been incessantly making for several years, under the successive direction of Messrs. Belgrand, Alphand, and Couche, to perfect the double line of piping that constitutes one of the most interesting peculiarities of the service.

It is unnecessary to say that the two parts of this system are interdependent, so that one can supply the other in the case of a failure of either. Yet, when we examine the other kinds of water introduced into Paris, we experience a certain dread at the idea of a substitution or mixture of them in the mains.

The administration asserts that such a mixture never occurs, and we believe it; but a substitution of one of these waters for another is obligatory in certain cases. When an accident happens to the piping, or when the sources fail in summer, the Seine water is substituted for a short time for that of the Vanne in certain quarters, and after the public has been notified of it through the newspapers.

Such an occurrence, however, is extremely rare. In 1885, there were but ten days in which the spring water failed to such a degree as to make it necessary to substitute other water at certain points. We cannot help regretting, nevertheless, that the spring water mains have to ever be traversed, even momentarily, by so impure water as that of the Seine or other river.

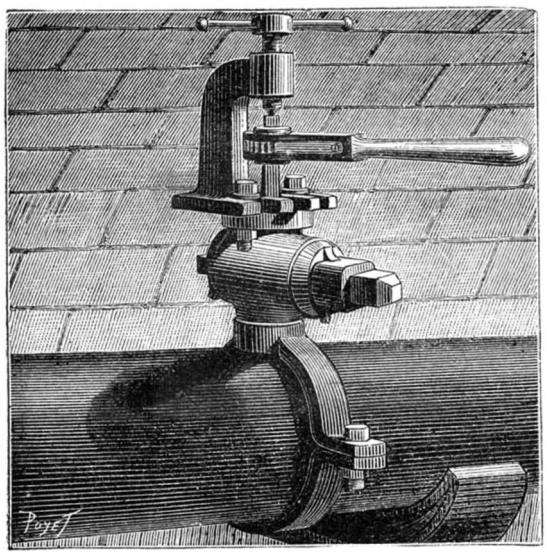


Fig. 4.—DRILL FOR BORING HOLES IN WATER MAINS.

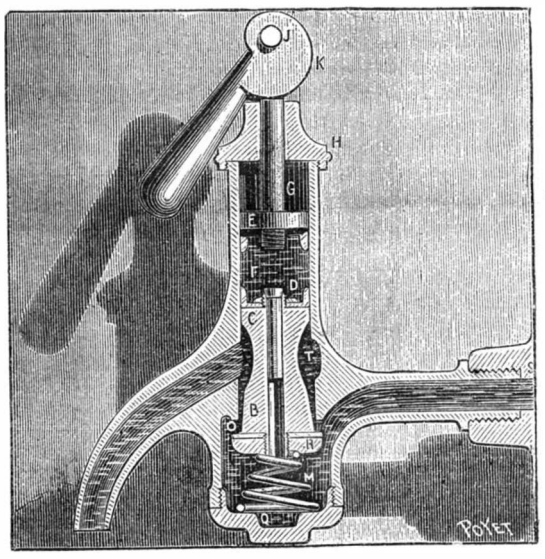
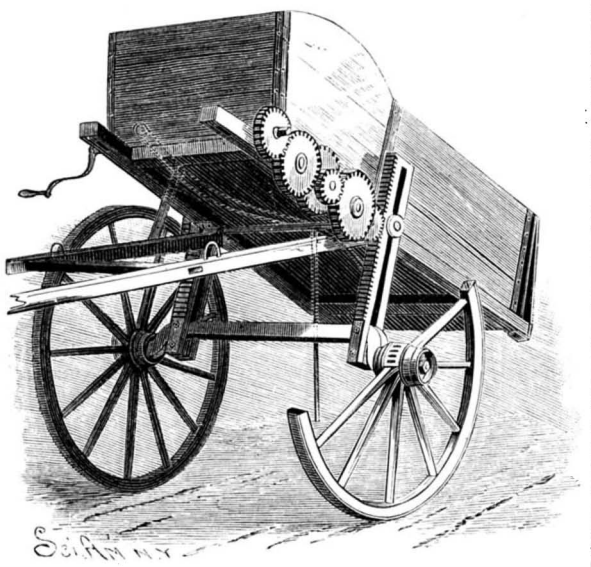


Fig. 5.—CHAMEROY'S INTERMITTENT COCK.

The whole of one side of the water service exhibition hall is occupied by an immense model representing the processes employed in the distribution of water in Paris. This comprises a sidewalk raised above the floor, and which is reached by a lateral stairway. Along this sidewalk runs the public roadway, and beneath this is arranged a distributing main with which are connected a fire hydrant, a water post, and hydrants for washing and sprinkling. Visitors are thus easily enabled to obtain an idea of the way in which water is introduced for the various requirements of the public streets, for cleaning and sprinkling purposes, and for the fire service. At one point of the sidewalk is shown a sewer manhole, with a safety covering, invented by Mr. Boutillier, chief superintendent of bridges and roadways. This device serves to prevent people from falling into the sewer. It consists of a metallic ring, to which are affixed converging ribs that support a wire lattice work. By reason of its light weight (13 lb.), it can be easily carried about by one man (Fig. 3).

Such as it is, with its 1,020 miles of conduits, the piping for the water service of Paris is, as a whole, vaster in extent than any other in the entire world. London, to cite but that city alone, is supplied by nine companies, whose lines of piping are independent, so that, from this point of view, it forms nine distinct cities,



SCHALL'S IMPROVED DUMPING CART.

each of which is equal to a second rate capital only. It very naturally results that Paris is likewise the city in which it is most troublesome to discover leakages, and in which it is most difficult to prevent errors in the details of maneuvering, and to find them out soon enough to remedy them in time, after they have been committed. It is important, then, to know at every moment whether all is well with the distribution, that is to say, whether the pressure is anywhere lower than it ought to be. For ascertaining this, the administration, three and a half years ago, established manometer stations, designed for facilitating the search for leakages, and for the control of the distributing maneuvers. These stations comprise a pressure gauge, affixed to a lamp post, and connected in the sewer with an apparatus consisting of two superposed cylinders of thick glass separated by a rubber diaphragm, which forms a passive partition between the ascending column and the branch that communicates with the water main. A brass cage guards the glass against external shocks, and allows of a verification, at any time, of the state of the diaphragm, which should remain horizontal as long as the apparatus is in a condition for operating normally.

As the diaphragm acts only as a partition between two strata of liquid in equilibrium, it follows only the motions that correspond to those that occur in the pressure gauge tube. Such motions are necessarily almost imperceptible, and every apparent depression of the diaphragm is a sign of a leak in the branch ending at the pressure gauge, and is logically followed by an increase that confirms the necessity of an examination. The apparatus communicates, through the lamp post, with an external cast iron dial, electro-plated with copper, and protected by a wire screen, through which may be read the state of the pressure in the main. Plates in relief, forming part of the elegantly designed dial case, give the nature of the water, the number of the station, the diameter of the main, and the respective altitudes of the latter, of the ground, and of the axis of the pressure gauge (Fig. 2).

Another interesting apparatus is one that permits of boring a hole in the main under pressure, in order to form a new branch at any point, without interrupting the circulation of the water. This is shown in Fig. 4. The cock from which the new conduit is to branch is inserted in the main while the hole is being bored, and automatically as it were, and the connection is made without the loss of a drop of water. During the operation, the few iron shavings that are formed drop into the main and are carried off by the water. As may be conceived, such cocks are numerous in a city like Paris, and are still more so in the dwellings, for the various needs of daily consumption.

The water is now delivered, as per policy, either by gauge or by the meter. Paying for it at so much per cock, which was formerly so much in vogue, for domestic uses, gave rise to so many abuses that it is now abandoned, save in the case of apartments, where it is stipulated that the special cocks shall prevent a continuous flow. The various kinds of these cocks now used are shown at the exposition. Among them, there is one that is of very recent invention, and is due to Mr. H. Chameroy. This apparatus (Fig. 5) is thus put in place: The cap, H, is removed, and the piston, E, and clack valve, D, are taken out; both the valve, D, and its seat are carefully wiped, and the cock is screwed to a coupling affixed to the conduit. A glass of water is poured into the cock, in order to fill the lower chamber, M, the clack, D, is introduced, the chamber, F, is filled anew, and then the piston, D, is introduced with care up to the upper level of the cock, and the excess of water escapes through the upper orifice. Then, while the handle, L, is held back, the cap is screwed on again. This operation is indispensable in order to expel the air contained in the chamber; for without such a precaution, ram strokes would occur. The cock being charged, it suffices, in order to get water, to push the handle down. When once the flow is interrupted, the handle is raised, and then, on being depressed anew, the same volume of water will flow.

The internal mechanism operates as follows: When the handle is pushed downward, the cam repels the piece, G, which drives the upper piston, E; the water in the chamber, F, transmits this motion to the lower piston, C, which is connected with the clack, B, and the water escapes freely through the orifice, O; but the action of the spring causes the clack, B, to rise so slowly that the water in the chamber, F, finds it difficult to escape through the small clack, D, which closes the conduit, Z, more or less perfectly. If the water takes a minute to escape from the chamber, a volume of water will pass during the same time, under the direct pressure of the conduit, through the orifices, S, O, T. In order that the same volume shall flow under all pressures, a movable tube with apertures is introduced into the orifice, S, in order to reduce the velocity of the water according to the pressure to which the cock is submitted.

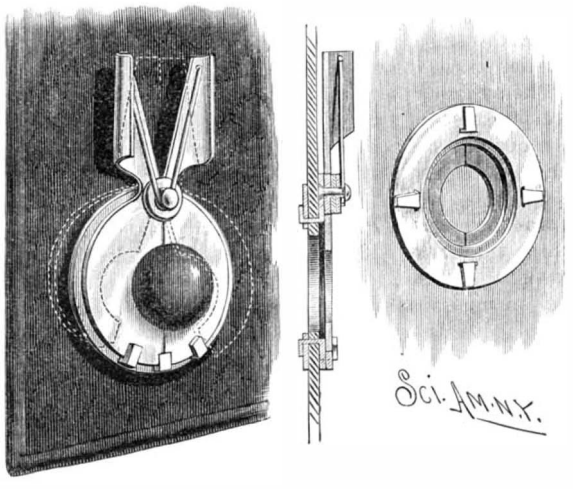
In this way the water may be distributed at discretion and without control; but it is impossible for subscribers to cause a continuous flow. They can get from 14 to 18 pints of water every time that they depress the handle, and stop the flow at will by raising it; and so too, by depressing the handle slowly, they can vary the velocity of the flow, and consequently regulate the discharge. Whatever be the volume that flows, it will never be able to exceed that for which the cock has been regulated, seeing that its construction prevents any constant discharge of water from taking place, and that, too, whatever be the position of the handle.—*La Nature.*

IMPROVED DUMPING CART.

The accompanying engraving represents a novel form of dumping cart, the invention of Mr. Reuben T. Schall, of Norristown, Pa. The axle is provided with two vertical racks, formed upon the forward faces of standards having longitudinal slots. Engaging with the racks are small gear wheels, carried by a transverse shaft mounted in bearings on the wagon frame. Upon one side of the frame is mounted a train of gearing, operated by means of a crank handle, and engaging with the wheel that meshes with the rack, so that when the crank is turned the gear wheels will travel up the racks, and raise the cart body and shafts. After the cart has been sufficiently elevated to permit of the dumping of its load into a chute, a properly arranged lever upon the side of the cart opposite the gearing is drawn down, and the body of the cart swung to the position shown in the engraving, the rear end being supported by a staff connected with the lever near its back end. The cart frame is provided with two studs, having disk-shaped heads, which ride within the slots in the standards, and thus guide the cart body, the disk-shaped heads fitting against the outer face of the standards. The shafts are pivotally connected to the frame, the forward parts of the side timbers of which are slotted to permit the passage of staples carried by the shafts, a bar being inserted in the staples above the frame to keep the cart from dumping.

CURTAIN FASTENER.

The curtain fastener herewith illustrated is the invention of Mr. Wm. Wiedemann, of Lawrence, Kan. To the base plate are pivotally connected two jaws; the inner portion of each jaw is formed with a semicir-



WIEDEMANN'S CURTAIN FASTENER.

cular recess and the outer portions form thumb wings, and are normally held apart by a spring. By pressing upon the thumb wings, the jaws are thrown apart to permit the head of the button to pass between them, so that when the pressure is released the jaws will close about the shank of the button and firmly hold it. In applying this fastener to a carriage or other form of curtain, ears on the base plate are forced through the curtain and passed through apertures made in a retaining ring, after which the ears are turned down to clamp the fastener to the curtain. This fastener will hold the curtain against displacement by the wind, and can be easily buttoned and unbuttoned.

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MACADAMSFINS.

(*Continued from first page.*)

the world never dreamed of, have been produced; life boats have been devised; lights and signals improved; compartments arranged; human ingenuity has been applied in all possible directions, with the object of preventing disaster and of saving life. But the hard fact remains that until this present day all these efforts, all these expenditures, have been fruitless in respect to the discovery of efficient means for averting the greatest of marine disasters, namely, collisions.

When collision is imminent, whether between vessels on the smooth waters of rivers or lakes or on the open sea, in clear weather or in fogs, against icebergs, sands, or rocks, in nine cases out of ten the danger is foreseen by those on board, for a short time, generally for several minutes, for a few seconds at the least. What a blessed thing it would be if every vessel were furnished with a device whereby it could be instantly stopped, when going at full speed, or say within a space of a dozen seconds of time! Such a device would be of unspeakable value in preventing disaster, and would wrest from the sea some of its greatest terrors.

It is this invention we to-day illustrate and describe. As before intimated, it is now in daily practical operation, open to the public and to critical examination by any one who desires.

Our illustration represents the steamer Florence, which is fitted with the invention. Our drawing is from an instantaneous photograph, and shows the water effect produced by the fins at the first moment of operation. The invention consists of a pair of fins or broad rudders, attached one on each side of the vessel, near the stern. By the pull of a trigger or lever, or by the touch of a button, from the pilot in the pilot-house or the look-out man at the bow or other convenient place, the fins are instantly thrown open, the water piles up against them with tremendous force, and the progress of the vessel is almost instantly arrested while the engines are still working.

The following official report lately made at the instance of Commodore Chandler, of the Brooklyn Navy Yard, gives the particulars of the Florence, and well describes the nature and remarkable practical workings of the invention:

NAVY YARD, NEW YORK, August 6, 1886.

SIR: In obedience to your order of July 13, 1886, we have made a careful and thorough test of John McAdams & Sons' patent marine brake, and respectfully report:

The brake in question is attached to the steamer Florence, a sidewheel steamer, 127 ft. in length, 21 ft. 6 in. beam, 6 ft. 6 in. draught at stern, and 171 tons measurement; she has a speed of from 10 to 12 miles per hour.

The brake consists of two plates of iron, 8 ft. 6 in. × 8 ft. 6 in. × $\frac{5}{16}$ in. re-enforced horizontally by four 5 in. wrought T-irons placed equidistant apart. Sheet plates are hinged on their after ends to the stern post and planking, and are carefully fitted to the stern of the vessel; at the forward end of each of these plates, and at the points where they are re-enforced, are attached chains which pass inboard through dead eyes, inserted in the planking of the vessel, upward in a water tight channelway, to and over a sheave placed above the level of the water, and immediately below the main-deck beams. These four chains are united in one, which, passing over the sheave above mentioned, is connected with a rod running through a cylinder containing twenty-three spiral car springs, 8 in. long by 6 in. diameter, placed end on end, each re-enforced by a smaller spiral spring in its center.

The cylinder containing the springs is secured to the deck beams and hull of the vessel. These springs act as a cushion, and receive that portion of the pressure which is transmitted to the chains. Attached to the main chain, before its connection with the spring rod, is another chain leading to a windlass, by means of which the brake is drawn in and secured closely to the side of the vessel.

A spring is fitted between the side of the vessel and the plates to start the latter when required. A hinged pawl holds the plates in place when closed, and can be tripped by means of a wire passing from it to the pilot house.

The operation of the brake is as follows:

The pawl being tripped by means of the bell wire, the windlass relieves the chain, and the spring, acting upon the inside of the brake, forces it slightly outboard, permitting the water to enter between the sides of the vessel and the brake.

The pressure of this water produced by the velocity of the vessel forces the brake open, when it is checked by the four chains attached to its outboard edges, and the force of the blow is cushioned by the spiral springs at the end of the chain. The strong pressure of the water forward of and acting upon the 110 square feet of immersed brake immediately checks the speed of the vessel, and quickly stops her.

Experimenting with the brake, the board found that it was tripped and operated with the greatest facility and safety, the jar being very slight, as the force was cushioned and gradually communicated to the vessel through the springs.

When the engine was stopped at the moment of tripping, the vessel stopped in 22 seconds, and inside of her length. When the engine was backed and the brake sprung at the same moment, the vessel was stopped and moved in the opposite direction in 12 seconds, and in a space of about 35 feet. When the brake was sprung with the engine still going ahead as rapidly as possible, the speed of the vessel through the water was immediately arrested, and her motion so slow that no serious damage could have been effected had the boat collided with another.

Operating one wing of the brake as an aid to the rudder, the vessel was turned in a circle of about 150 yards diameter, and changed her course 90° in 50 sec., making a complete circle in 3 minutes and 47 seconds; whereas without the brake, and with the rudder alone, the circle was about 250 yards diameter—90° change of course obtained in 42 seconds, and the complete circle in 3 minutes and 27 seconds. The velocity of the vessel in the former case was greatly retarded by the brake.

As a means of preventing accidents when a vessel having this brake is in danger of colliding with another, it is unquestionably a success, and if properly fitted, cared for, and kept in order, can be thoroughly relied on to work satisfactorily; but in the evolutions of naval vessels while in action, the brake would never be used, as it would retard, rather than increase, the facility with which the ships could be managed. Inclosed we forward tracings of the brake.

Very respectfully, your obedient servants,

JNO. W. MOORE, *Chief Engineer, U. S. N.*
BIRS C. SAMSON, *Cadet Engineer, U. S. N.*
M. A. ANDERSON, *Cadet Engineer, U. S. N.*

To the Commandant, New York Navy Yard.

COMMANDANT'S OFFICE, NAVY YARD, NEW YORK.
For information of Bureau Steam Engineering.
Forwarded Aug. 7, 1886.

R. CHANDLER, *Commodore Commandant.*

The only comment we have to make on this report is in respect to the conclusions of these officers that the fins would never be used by naval vessels in action. This, we think, must have occurred because the turning qualities were not properly shown to them, and they have not foreseen the other advantages in a naval action. Neither of these examiners, we fancy, would hesitate, in an action, to pull the lever and stop his ship to prevent going ashore or to avoid being rammed; nor would he refrain from steering with them by opening them slightly alternately as needed, if his rudder became disabled, or by striking a torpedo, as in Mobile Bay, when the Union ironclad Tecumseh and over a hundred lives were lost by running on visible torpedoes. In the varying emergencies of an action, there are moments when the judicious use of this invention would be of supreme importance, perhaps decisive of the battle. We think a war vessel should have at least as many advantages as other vessels.

We have had the opportunity of witnessing several trials of the invention on board the Florence. Our observations fully confirm, and, indeed, have given us results even more favorable than those set forth in the above report. The crushing power or principal momentum of the boat seems to be overcome in about ten seconds after the trigger is pulled, and within a distance of about twenty feet; or in other words, she stops in less distance than she travels in one second. We also understand that a 1,400 ton steamer has been just as successfully stopped.

An idea of the vast importance of this invention may be formed by considering some of the published statistics. According to the London *Times*, the record of collisions and wrecks for the five years ending 1881 numbered 8,865, and the number of lives lost was 19,034. Doubtless the majority of these disasters would have been prevented had the vessels been provided with the Macadamsfins. It seems almost certain that such disasters as the sinking of the Oregon, or that of the colliding of the Gijon and the Laxham last year, by which 200 lives were lost, or the collision of the Cimbria and the Sultan, 300 lives lost, could not occur where this invention is employed. The success of the Macadamsfins is an immense gain for humanity. In our opinion, there is no honor too high, no reward too great, for bestowal upon its worthy inventor. It has only been by the exercise of the greatest perseverance, and the expenditure of large sums of money, by himself and his sons, that he has at last succeeded in perfecting it. The value of the service he has rendered to his fellow men in developing this improvement is incalculable.

This invention should have the immediate attention of our own government and of every maritime nation. It is one of those great humane inventions that should, if possible, be made free by governmental purchase if required. At a comparatively small expenditure, every ship, every steamer, every craft that floats, can be fitted with the Macadamsfins; and laws will doubtless be duly passed requiring its adoption. Applied to large vessels, its operation will be even more certain and effective than on small boats, for the deeper the ship, the more powerful will be the action of the fins. Our Navy Department should lose no time in applying the invention to one of its largest vessels, with a view to determine the forms and proportions best adapted for all ships in the service. The Chamber of Commerce will do well to use its influence in calling the attention of owners and masters to the importance of the invention, as indicated in the foregoing report and as exhibited daily on board the Florence. The steamer leaves the Brooklyn Bridge wharf for Staten Island every week day at 10½ A.M., returning at 1 P.M. Further information can be obtained from John McAdams & Sons, 978 Kent Avenue, Brooklyn, New York, U. S. A.

Remarkable Collection of Homing Pigeons.

An enormous flight of pigeons, consisting of some seven hundred or eight hundred birds, took place at Dover, England, on the morning of August 30, for a race from that place to Brussels. The birds were brought over on Saturday night in baskets, which formed part of the deck cargo of the Ostend mail packet. The pigeons belong to different Belgian societies, and were flown in connection with the society Sans Peur, of Laeken, near Brussels. The start was a very interesting sight. The channel being fairly clear, the baskets were placed in tiers on the quay, the flaps on a given signal were let down, and simultaneously the birds rose like a cloud, and, after circling in the air for a moment, headed southward and made off in the direction of Calais, all being well away within the space of two minutes. A similar race is being arranged from London to Brussels. Some five hundred birds, trained to act as messengers in case of war, and belonging to different societies in and around Paris, were also recently flown from Dover to Paris.

As our readers probably know, the training and flying of homing pigeons has become the national sport in Belgium. Almost every family has a pigeon chamber in the upper part of the house. Baseball in the United States is nothing as compared with the homing pigeon sport in Belgium.

The Chevreul Centenary.

On August 31 of the present year, Michel Eugene Chevreul, one of the greatest of the chemists of France, completed his one hundredth year. He has now entered the second century of a life of unselfish labor in his profession. His history is of special import at the present time, when money is by so many considered the criterion of personal worth. For Chevreul in his discoveries had the opportunity of making a colossal fortune, but took no advantage of his abilities, save in the direction of science. The entire stearic acid industry was founded by him, and has yielded millions to its commercial prosecutors. From his earliest years he was a worker in science, a pupil of one of Lavoisier's disciples, a celebrated scientist wedded to his laboratory, so busy in his work that he "had no time to make money." His life, marked by its labor and its utter simplicity and abstemiousness, is a fit model for the scientific worker. He drinks nothing but water, unless his physicians insist on his mixing it with some stimulant, and then he uses beer. A little meat, eggs, and beans constitute his diet. His work, besides the memorable fatty acid investigation, embraces the theory of colors, wherein his researches were classic.

Besides this, he has traversed the whole field of chemistry, leaving his foot-marks everywhere. He discovered the cause of the brightness of Rubens' yellows. The great Dutch painter had empirically hit upon the use of complementary colors as contrasts, and so had brightened his colors. Delacroix seized upon this beautiful discovery and utilized it to such good purpose as to win by his celebrated color effects much of his renown. In 1803 Chevreul began his studies of chemistry, and distinguished himself by original work. In 1882 he convulsed the French Academy by quietly stating that "the experiments he had described were not of very recent origin; he had reported them in outline at a meeting of the Academy in 1812" (*L'Illustration*).

In honor of his centenary, a banquet was given at the Hotel de Ville, in Paris, on August 31, which was participated in by some 350 guests. A festival and torchlight procession on the boulevards followed, and, by some process, the astute General Boulanger, who was present at the banquet and in the procession, seems to have been converted into the lion of the hour, being subsequently serenaded at his residence.

At present, Professor Chevreul spends his days in the laboratory of the Gobelin Tapestry manufactory, where he has been professor of chemistry and director of dyeing since 1824—for 62 years. There seems little reason to apprehend his early death, save for the bare fact that he has passed the century of life that is accorded to so few. Authentic instances of centenarians are extremely rare.

IT is said that the application of a bit of ice, or even cold water, to the lobe of the ear will stop hiccoughing.

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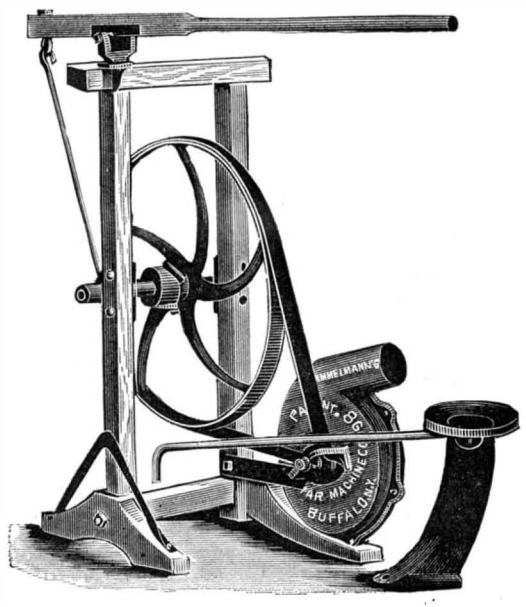
THE STAR BLACKSMITH'S HAND BLOWER.

The blacksmith's hand blower which we herewith illustrate is the invention of Mr. C. Hammelmann, and is manufactured by the Star Machine Company, of 198 and 200 Terrace, Buffalo, N. Y. The main wheel is revolved by means of a rack, which is moved up and down in guides attached to one of the standards, and which engages with a pinion provided with a suitably arranged clutch. The rack is operated by a lever hung on a swivel. By means of set screws, any wear of the pinion and rack can be taken up. This blower can be



THE STAR BLACKSMITH'S HAND BLOWER.

easily attached to any stationary hearth; it occupies a floor space of only about two feet square. With little labor it will produce all the blast needed by any blacksmith's fire.

THE "QUAKER CITY" GRINDING MILLS FOR CORN AND COBS, GRAIN, BONES, ETC.

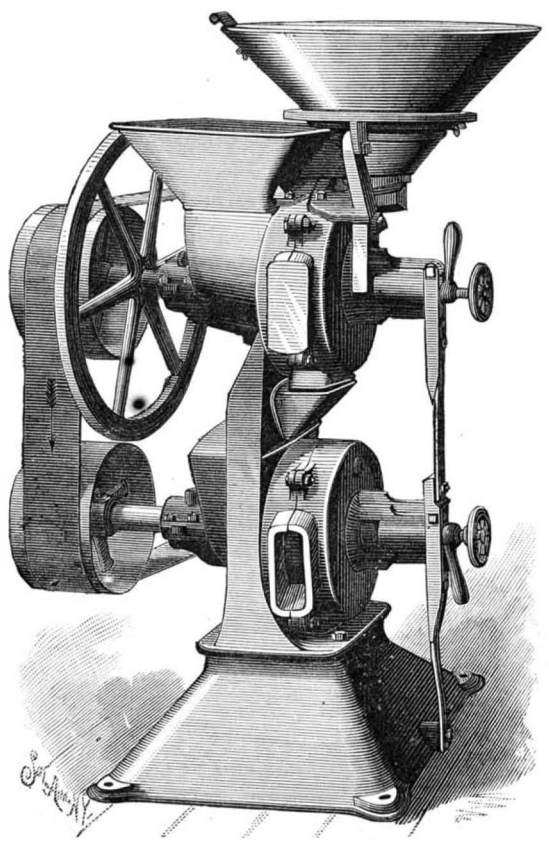
The accompanying illustrations represent some recent improvements in a well-known disk grinding mill, adapted for grinding grain, corn, and oats mixed, or corn and cobs, both old and green, bones, etc., as well as for grinding minerals and paint, and a wide variety of work. The cutting of the cobs, bones, etc., is effected by a hardened cast steel knife, let edgewise into the cone-shaped cutter-head upon the spindle. When this knife requires grinding or renewing, it is lifted from its seat by driving a cold chisel under one end, and it can be easily driven back again after sharpening.

It is shown in position upon the spindle in the illustration, near the single grinding mill. Back of the knife, and inside of the grinding disks, is a series of pockets formed in the cone head, to act as receptacles when the knife cuts too fast for the disks to grind, these pockets delivering their contents to the disks when the knife cuts slower, and thus equalizing the work. One such knife upon the cutter head is considered preferable to more than one, as allowing more time for the cobs to descend between cuts.

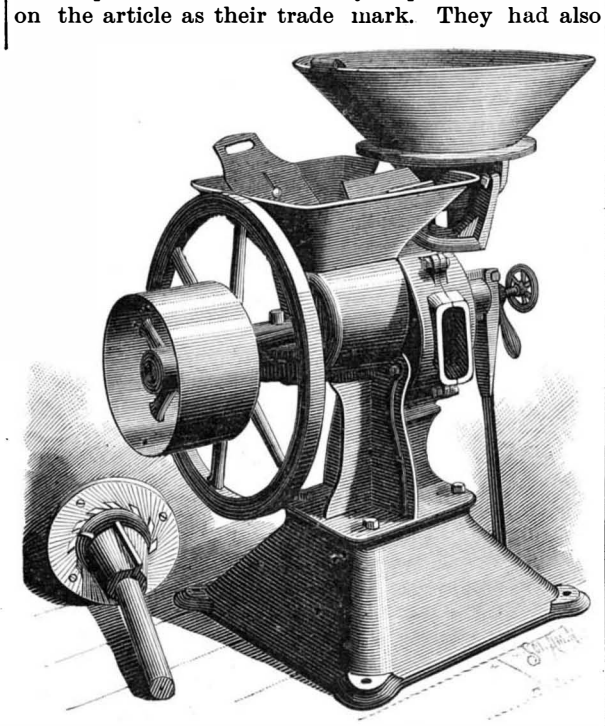
The double mill works on the principle of gradual reduction grinding, the top mill cutting and grinding as fine as a single mill, and then discharging into the lower mill, which grinds still finer, and discharges the product from either side of the case as desired. The belt, as shown, passes over both pulleys, in the manner indicated by the arrow, thence back to the driver, and in this way is found to work well, without slipping. A hopper and feed shoe is provided for feeding all shelled grain.

The grinding disks are of cast steel, interchangeable, and cheaply renewed. They are divided into the saw-toothed inner edge or eye, upon which is located the conveyer flights; the bosomed space between the disks is filled with furrows, running their knife edges front to cut the grain fine, and the flat outer portion with furrows running their inclined side front, crushing or mellowing the already cut meal, in the manner of corrugated rolls running at different speeds. The spindle is of steel, with hardened steel button between its end and the temper screw. It has a hub which carries the running disk, cob-cutting knife, eccentric, and pulley.

These mills are manufactured by Messrs. A. W. Straub & Co., of No. 3737 Filbert St., Philadelphia, Pa.



STRAUB'S "QUAKER CITY" DOUBLE GRINDING MILL.



STRAUB'S 'QUAKER CITY" SINGLE GRINDING MILL.

An English Trade Mark Case.

In the Court of Appeal, London, Lords Justices Cotton, Lindley, and Lopes recently decided the question whether a representation of the article sold could be itself used as a trade mark.

Messrs. Edward James & Sons manufacture black lead in the shape of dumpy cylinders rounded at one end. To these they had applied the term "Dome-shaped," and had registered a black dome as their trade mark for the article in 1877.

Last year they brought an action against M. J. Parry & Co., to prevent the use by them of certain labels on which representations of "cylinder" black lead appeared, which the plaintiffs alleged infringed their trade mark. The defendants moved to have the plaintiffs' design removed from the register of trade marks, on the ground that it was not the proper subject of a trade mark. The late Mr. Justice Pearson, on December 21 last, gave judgment for the defendants, holding that a pictorial representation of the actual article to which a mark is applied is not a proper trade mark. He said that it was curious there had been no decision on the subject in the courts of this country, though there were several in those of the United States of America in accordance with his view. Since the hearing by Mr. Justice Pearson, Messrs. Parry & Co. have ceased to manufacture black lead, and have discontinued the use of the mark in question, so that the injunction has become immaterial to the plaintiffs; but the plaintiffs appealed from the decision so far as it ordered the registration of their trade mark to be vacated.

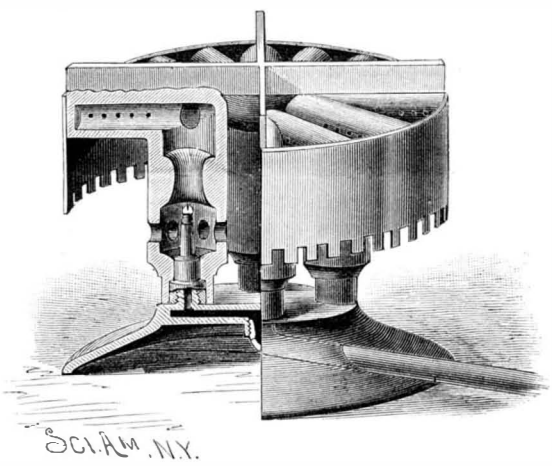
Lord Justice Cotton said that the only question was whether Mr. Justice Pearson was right in saying that the dome could not be registered as a trade mark. The plaintiffs could not possibly claim any monopoly in the shape. But the registration of the mark did not purport to give them any such monopoly. They claimed a right to use the dome as their trade mark, in whatever shape they might sell their black lead. In his Lordship's opinion, there was nothing to prevent its being registered under the Act as a trade mark. The Act (that of 1875) required, by section 10, that a trade mark should consist of (*inter alia*) "a distinctive device, mark, heading, label, or ticket." Was this dome a "mark"? It certainly was. Was it distinctive? His Lordship thought it was, and that it would be so, even if the plaintiffs sold their black lead in a different shape. Mr. Justice Pearson treated the case as an attempt to register a picture of the article that was sold. But it was not really that. It was true that the plaintiffs did sell their black lead in the shape of a dome. But they impressed the mark on the article as their trade mark. They had also used the words "registered shape" on their labels. That was wrong. But, in his Lordship's opinion, the dome could be registered as a trade mark. Some American cases had been referred to, and of course this court would pay regard to the decisions of American judges, though they were not binding on it. But in his Lordship's opinion, the cases referred to were not authorities upon the point raised in the present case.

Lord Justice Lindley was of the same opinion. The evidence proved that the dome was a distinctive mark. Why, then, should not the plaintiffs place it upon the article which they sold? If they chose to sell their black lead in the shape of a cube or a sphere, why should they not mark it with a dome? His Lordship agreed with Lord Justice Cotton as to the American cases. He was unable to adopt the view of the American judges as applied to the English statute.

Lord Justice Lopes concurred. He said that by a "distinctive mark" he understood a mark as to which, in case of an alleged infringement, it would be clear what that infringement was, and a mark distinct from all other marks used in the same class of trade. It was said that this mark could not be registered because it was a picture of the article itself. But it could not be disputed that it would be a "distinctive mark" if the plaintiffs sold the article in the shape of a square. Why was it the less a "distinctive mark" because the article was sold in the shape of the mark itself? The American cases were of very little value without seeing the American Act upon which they were decided.

IMPROVED GAS STOVE.

This stove may be formed of a single chamber, having at its top radiating hollow arms formed with a series of holes in each of their sides from which the escaping gas is burned, and having its bottom, in which are air inlet holes, contracted to fit snugly upon the gas jet. The air holes are placed slightly below the top of the jet, and serve to admit air, which mixes with the gas on its passage to the burner holes, thereby causing a thorough combustion, with intense heat, and without smell or the formation of lampblack.



BISBEE'S IMPROVED GAS STOVE.

Upon the upper surface of the arms are suitable supports for holding the object to be heated.

Or the stove may consist of several chambers, each formed at its upper end with a cluster of radiating hollow arms, as shown in the engraving. The lower ends of these chambers fit upon gas burners, and are constructed in the same manner as the one already described. This arrangement provides for the free escape of the products of combustion and also for the free access of air to the gas jets, so that the carbonic acid gas given off at one part of the stove will not deaden the flame at another. The side rim directs a copious supply of air to the burners and prevents side draught from deflecting the flame from the object being heated.

This invention has been patented by Mr. Clarence L. Bisbee, of 198 17th Street, Brooklyn, N. Y.

Balloon Photography.

M. M. Tissandier and M. Nadar, the well known Parisian photographer, made a balloon ascent from Auteuil on July 2, 1886, at 1:20 P.M., and subsequently descended at Segrie (Sarthe) about 7:10 P.M., after a journey of 180 kilometers. The altitude reached was not over 1,700 meters, and during the voyage M. Nadar took not less thirty photographs of the instantaneous kind. Of these there were about a dozen which are said to be by far the finest specimens ever obtained from a balloon. They comprise two views of Versailles, showing in plan the palace and one part of the gardens from a height of 800 meters. Another is a view of Sevres above the porcelain factory from a height of 600 meters. A third gives a view of a quarter of the town of Belleme (Orne) from a height of 900 meters; and others give views of the little town of St. Remy (Sarthe) and its environs. The height in some of the latter cases was 1,200 meters. The time of exposure for the gelatino-bromide plates was $\frac{1}{250}$ second. The photographs have been enlarged by M. Nadar with a new kind of Eastman paper, and the fineness of the detail shown is remarkable.

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THE SHADOW BIRD AND ITS NEST.

Many birds build nests of double compartments, but there is one bird at least which has three distinct chambers in the large nest it builds. This is the shadow bird (*Scopus umbuetta*), an African species. In speaking of them, Layard says:

They are strange, weird birds, frequenting ponds, marshes, rivers, and lakes, flitting about with great activity in the dusk of the evening, and preying upon frogs, small fish, and similar fare. At times, when two or three are feeding in the same small pool, they execute a singular dance, skipping around one another, opening and closing their wings, and performing strange antics. They breed on trees and rocky ledges, forming a huge structure of sticks and clay. Some of these sticks are of considerable thickness. The nests are so solid they will bear the weight of a full grown man upon their dome top without collapsing. The entrance is a small hole, generally placed on the most inaccessible side. The pure white eggs are from three to five in number. On my late friend Jackson's farm, at Nels Poort, there is a singular rocky glen between two hills. In this spot a beautiful permanent spring, called Jackall's Fountain, takes its rise. Of course, in consequence, there are wild almonds and other trees; indeed, the place is a little oasis amid the barren mountains, and a favorite resort for hyenas, jackals, leopards, and other wild animals.

On the ledges of rocks in this secluded spot a colony of shadow birds have built for years. Some of the nests are quite inaccessible, while others can be reached with a little trouble. I counted six or eight within fifty yards, all exhibiting the same form and structure, and some of them containing at least a huge cart load of sticks. About some that I visited I found brass and bone buttons and bits of crockery, bleached bones, etc. Mr. Jackson told me if a black lost his tinder box on the farm, or his knife, or any other small portable personal property, or if such article were lost within several miles of the place, he made a point of examining these nests, and frequently with success; the occupants, like the brown birds of Australia, embellishing their dwellings with any glittering or conspicuously colored object they can pick up. In the karroo between Worcester and Robertson, I saw a nest placed on the ground on the side of a trifling rise. It was three yards in length by one and a half across, and had a small entrance hole at one end.

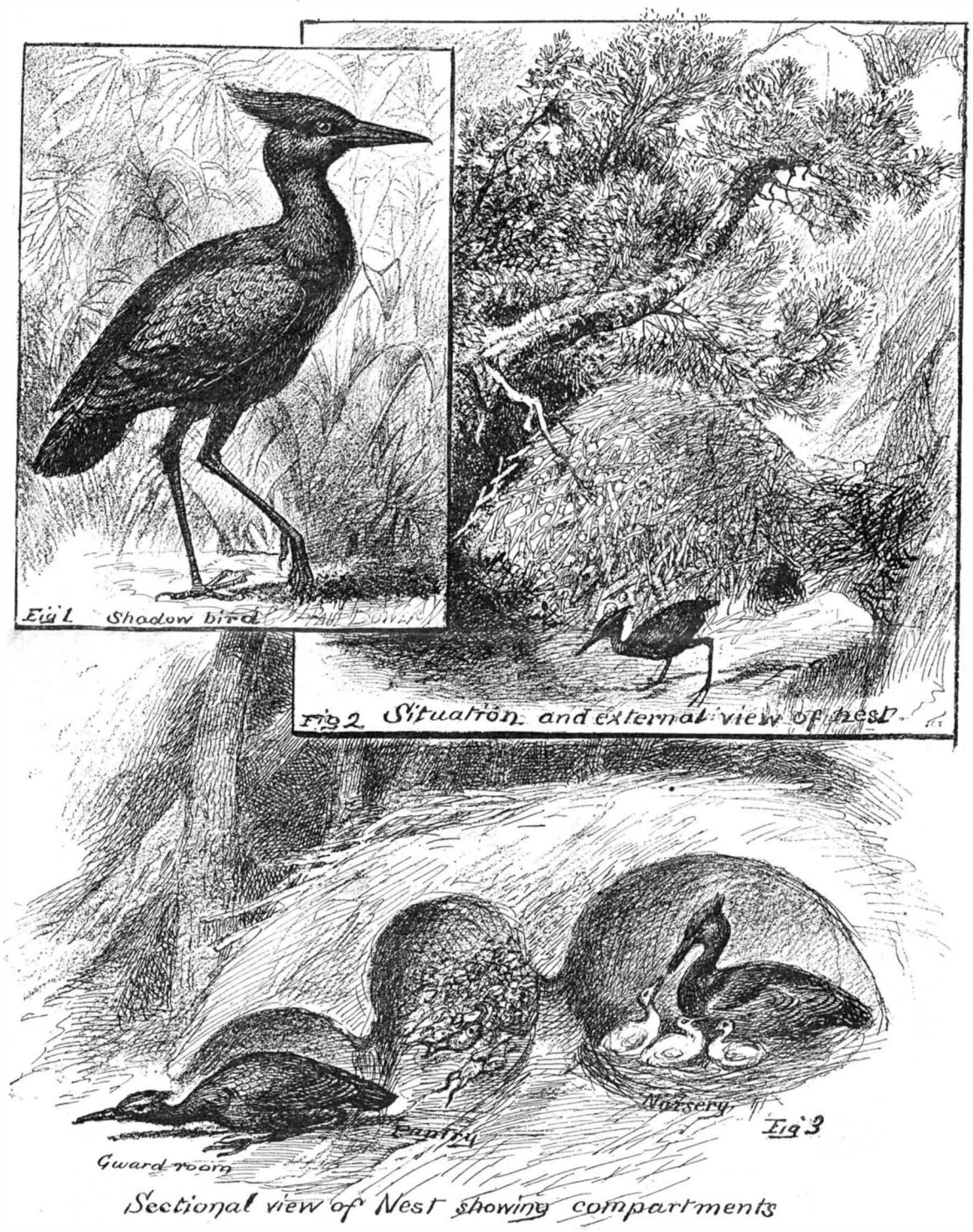
We learn from Jules Verreaux that these remarkable structures are built in three compartments, the partitions of which, like the outer wall, are carefully and, to use his expression, "artistically" worked together in twigs and clay, and are entered by a hole just large enough to admit the body of the bird.

Of these apartments the hindermost is the largest, and is so raised as to remain dry should heavy rains penetrate the other parts of the nest. So excellently, however, is the entrance constructed that such accidents rarely occur, or, if water should break through, are readily and at once repaired. The large back chamber, or nursery, is covered with a soft, dry bed of various vegetable fibers for the reception of eggs, which are hatched by the united attentions of both parents. The second compartment serves as a pantry, and usually contains a goodly supply of provender; while the small outer compartment is employed as a guard room, from which a strict watch is kept in case of approaching danger. Verreaux says that the vigilant owner crouches flat on the ground as he reconnoiters, keeping his head protruded through the entrance hole.

The young, when first hatched, are almost naked, with but a slight development of grayish-brown down. They grow slowly, and are tended with great affection by their parents, who feed them principally at early morning and in the evening.

The shadow bird is a wader, and represents a family possessing a compact, almost conical body, short, thick neck, comparatively large head, and broad, much rounded wing, in which the third feather is longer than the rest, and a medium sized, rounded tail. The high beak is longer than the head, straight, compressed at its sides, and bent at the tip. The feet are moderate, with toes but slightly connected. The head is decorated with a large crest, extending backward, and the thick, close plumage is of an almost uniform amber brown, with the under side of a slightly lighter tone. The quills are glossy, and somewhat darker than the back, and the tail feathers are relieved by a broad purplish-brown band at their extremities, and narrow, irregular lines of the same at their roots.

The eye is dark brown, the beak black, and the legs and feet either black or blackish-brown.



THE SHADOW BIRD AND ITS NEST.

The length is 20, and the breadth 40 inches. The wing measures 11⅝ inches, and the tail 6 inches. The female differs in no respect from her mate. This remarkable species inhabits all the central and southern portions of the African continent, including Madagascar. It is also met with in Southern Arabia, but is nowhere numerous.

Ventilation of Passenger Ships.

There are some annoyances which travelers continually experience with much discomfort, and with involuntary resignation assume are irremediable. Among these are the stifling, oily, painty, stale kitchen odor and sickening atmosphere of almost all the cabins of the steamers by which the shores of France, Holland, Belgium, and other countries are reached. It is always there, and is associated in the mind of every traveler as a gantlet to be run in the first part of a journey to the Continent, and a purgatory to be gone through as the final destroyer of the pleasures of a Continental holiday. Why the enormous numbers of long suffering English travelers have raised no voice on the subject is inexplicable, especially when the readiness to complain of railway shortcomings is remembered. There is no reason why steamship berths should not be well ventilated. Those who are robust and happen to have a main-deck berth can, in moderate and fine weather, open the side lights, especially if they do not object to a blast that would do to serve a forge fire. Those in the lower berths cannot enjoy fresh air even by this means, and must leave the door open and ventilate with the thick atmosphere from the interior of the vessel, which is laden with the odors already mentioned. In a rough passage, and when every part of the vessel is crowded with passengers, the combination of smells is enough to kill off all those who are not accustomed to what any physiologist would pronounce a poisonous atmosphere. This need not be; and as there are so many almost equally convenient routes to the Continent, it is surprising that some of the steamboat companies have not bid for the best patronage by effectively ventilating their vessels. A steamship berth is, of all places, the one which, if the least attention is to be paid to sanitary welfare and comfort, should be most plentifully supplied with fresh air; but it is the least, and natural sickness is aggravated by this unnecessary foulness.

Every berth should be connected with a thoroughly effective ventilating system, or every group of not more than three berths should have a complete and separate ventilation. Mechanically, there would be no difficulty about this. One of the simplest methods would be to fix one or two powerful ventilating blowers in suitable places for passing a large quantity of fresh air down into the saloon and passages, the exit for the air being only through outwardly ventilating openings, such as flat grids, with plate, valve-like covers. Communicating with these should be ventilating trunks, to carry off bad air by an opening placed in every berth. The arrangement need not involve any element of danger in the worst weather, and the blowers might be worked by the main engines or by a separate engine. A more efficient method would perhaps be possible by means of ventilators at different parts of the vessel, worked by means of water under a small pressure, each ventilator to apply to one or a few berths. This system would lend itself to any arrangement of berths; and with the facility with which water at from sixty to seventy pounds per square inch, and in the small quantity required, could be supplied by a pump worked by the main engines, would make this arrangement comparatively inexpensive. Thick lead or ordinary iron piping for the conveyance of the water costs but little, and is inexpensively laid. Ventilators of this kind were exhibited in the Health Exhibition, and one, which received a gold medal, acted either as a forcing or exhaust ventilator. There is presumably no difficulty in ventilating cabins which could not be easily overcome. The one preventive of proper ventilation on board passenger steamers is probably the cost of ventilating. The addition to the capital cost of a steamer for this purpose would, however, be small, and would soon be looked upon as insignificant, once steamship owners were taught to look on fresh air in berths or cabins as a necessity; and it is at least as much a necessity as fresh water, for on short voyages passengers can do without drinking water, where there are always plenty of aerated waters and other substitutes. Even in cold weather, passengers will run the risks of passing the night on deck rather than breathe through the night the stuffy atmosphere of cabins for which they have paid. Surely, it is time that some steps were taken in this matter, not merely for the comfort of the passengers, but as a most necessary sanitary reform.—*The Engineer.*

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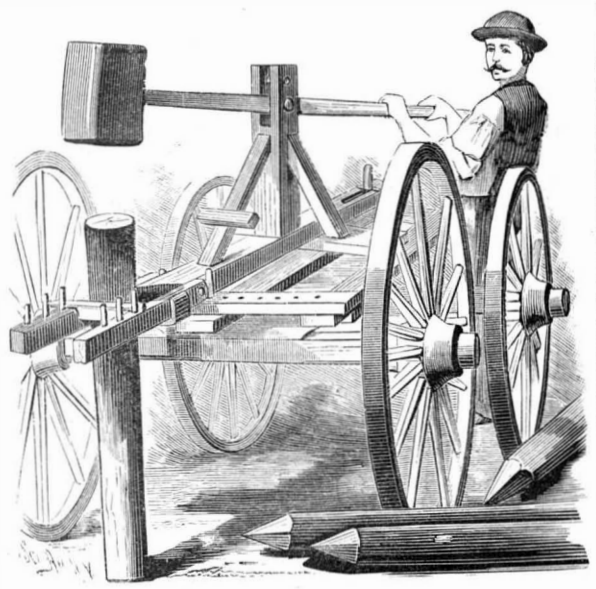
IMPROVED POST DRIVER.

The engraving represents a post driver arranged in connection with the running gear of an ordinary form of farm wagon. The post driver consists essentially of a central beam, through a slot in one end of which is passed a short vertical standard, carried by the forward cross strip of the frame of the wagon. The rear end of the beam is supported by the rear cross strip, in which is a series of holes, so that the beam can be held in different positions by pins. Pivoted in a slot in a securely braced vertical standard, carried by the beam, is a lever, provided at its rear end with a heavy hammer. To the rear end of the beam are pivotally connected guides.

The main beam can be swung to any desired position, and as its slot is quite long, it may be moved forward or backward, in accordance with the position of the post



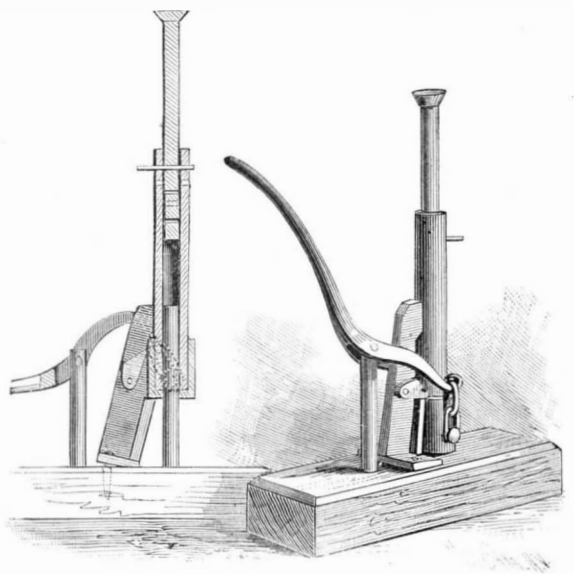
REISOR'S IMPROVED POST DRIVER.

to be driven. In operating the machine, the beam is placed so that when the upper end of the post is resting against the extended end of the beam, the post will be in a vertical position, the guides being then swung up out of the way. After the post has been thus placed, the guides are turned down and their cross bar is put in position to hold the post against the end of the beam. The operator then raises the hammer by depressing the opposite end of the lever, and allows it to drop upon the post, the force of the blow being varied by the amount of elevation given to the hammer.

This invention has been patented by Mr. Andrew S. Reisor, of Reisor, La.

LIFTING JACK.

The annexed engraving shows an improved form of adjustable wagon jack constructed so as to be semi-automatic in its operation. Rigidly secured to the heavy base block are two vertical standards. A tube is arranged about one standard, being stepped in and rigidly fixed to a sleeve formed with lugs, upon which there are placed two chains, the upper links of which are engaged by hooks formed at the ends of the arms of a forked lever pivoted to the other standard. In the upper end of the tube there is an adjustable rod.



CHURCHILL'S LIFTING JACK.

The tube and its rod are raised when the lever is depressed, and are held in an elevated position by a catch arm formed with a shoulder, which, as the tube is raised, falls in below the lower edge of the sleeve. When it is desired to lower the tube, the lever is depressed. This movement causes the sleeve to strike against an inclined face on the upper end of the catch arm, which is moved away sufficiently far to permit a cam faced guide pivoted to the arm to fall to a horizontal position, as shown in the right hand figure, when it will hold back the catch arm during the descent of the tube.

This invention has been patented by Mr. J. W. Churchill, of Clark's Green, Pa.

A Remarkable Artesian Well in Iowa.

Quite a sensation was made on Aug. 31 by the extraordinary force developed by an artesian well at Belle Plaine, Iowa. It had been drilled four inches in diameter to a depth of 180 feet, when suddenly a great volume of water burst into the air that was at first entirely uncontrollable, and an engineer was summoned from Chicago to assist in the emergency. The flow afterward subsided somewhat, though the well continued for a further period to yield an estimated quantity of 5,000,000 gallons daily, with a pressure of 25 pounds to the square inch. The well was sunk through the surface drift, shale, and blue clay, till it is supposed to have reached a stratum whose outcrop was about twenty miles distant, with an average dip of fifteen feet to the mile, thus giving an immense pressure from the distant fountain head.

BASEBALL—SCIENTIFIC BATTING.—NO. 2.

BY HENRY CHADWICK.

In the science of batting, there are certain rules, the neglect of which must prove damaging to the batsman's general play. First comes the rule which requires that he should "stand at ease" in his position when he takes his bat in hand; that is, to stand so as to be able to swing his bat to meet the ball with the easiest movement at command. Then comes the rule governing the proper method of swinging the bat forward to meet the ball with the best effect; in this latter rule, the manner in which the batsman stands has an important bearing. Then follows the proper method of poising the bat preliminary to making the forward swing in striking at the ball, which is also very important in making the hit effective. But the most important rule in the science of batting, which has, up to within a few years past, been but little understood, is that governing what is technically known as "facing for position," that is, taking your stand at the bat in such a manner as to control the forward swing of the bat to meet the ball so as to send it in the direction of either of the three outfield positions of the field at your option. The more intelligent class of professionals have found it expedient to pay more attention to this feature of scientific batting than hitherto, and the result has been a proportionate increase of skill in their batting. There are many points in scientific batting to be learned before a batsman can excel in strategic hitting. First, he must practically ascertain the bearings of the natural swing of the bat in meeting the ball, and the different effect of a swift stroke from a slow one in forming these bearings. Measuring the semicircular line of the swing of the bat, from the line of its position as it is held over the shoulder in readiness to strike to the point of its meeting the pitched ball, it will be seen that the swiftness of the forward stroke has much to do with giving special direction to the hit ball. A slow stroke will cause the bat to meet the ball back of the line of the home base, over which the ball has been pitched, while a medium stroke will meet the ball on the line of the base, and a swift stroke forward of that line. The effect of the slow stroke would be to send the hit ball to the right field; that of the medium stroke, to center field; and that of the swift stroke, to left field. The appended diagram (Fig. 1) illustrates the lines of these several strokes, in accordance with the forward swing of the bat against the ordinary speed of the pitched ball. The varied speed of the pitched ball, however, has to be taken into consideration, inasmuch as a slowly pitched ball would meet the slow stroke of the bat on the line of the base, instead of back of it, while a swiftly pitched ball would also meet the swift stroke of the bat on the line of the base, instead of in front of it. The pace of the pitched ball therefore becomes an important factor in estimating the force of the forward swing of the bat, in the effort to give the ball a special direction.

In practically carrying out this theory of measuring the stroke of the bat with the pace of the ball, we bring into play the art of facing for position, which art is simply that of standing in three separate positions, in order to send the ball from the bat in three distinct directions to the outfield.

This "facing for position" in batting is one of the great features of scientific batting, and it is a subject calling for some study of the rules which govern it. Just as the batsman stands at the bat, just so will the regular forward swing of the bat meet the pitched ball, all things, of course, being equal; that is, presuming that the rapidity of the forward swing of the bat is in right proportion to the speed of the pitched ball. But the general direction of the hit ball, from a properly proportioned swing of the bat, is governed by the manner in which the batsman stands when prepared to strike at the ball; that is, in proportion as he "faces" for the right, center, or left field. The appended diagram (Figs. 2 and 3) illustrates the lines of this "facing for position."

A close study of the various forces governing the swing of the bat in meeting the ball, and of the above rules applicable to "facing for position," will fully prepare a batsman for scientific batting.

From the moment the batsman takes his stand at the bat to the time he hits a fair ball, he should stand in proper form for hitting every single ball pitched to him. Unless he makes this a habit, he will surely be found a ready victim, to a more or less extent, for a skillful, strategic pitcher. The rule with a good batsman is always to be in form all the while he

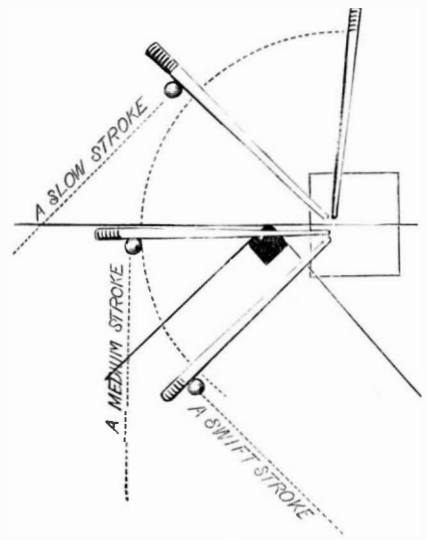


Fig. 1.

is at the bat. This is specially necessary to meet the uncertainties of a curved line delivery.

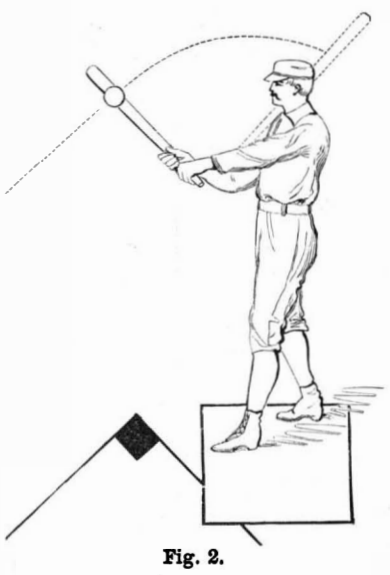


Fig. 2.

FACING FOR A RIGHT FIELD HIT.

Fig. 3.

FACING FOR A LEFT FIELD HIT.

Pasteur's Treatment for Rabies.

The *London Lancet* says: Another victim to hydrophobia, after having been submitted to M. Pasteur's anti-rabic treatment, has been reported. The subject was a young girl of eleven years of age, who was bitten at Chassagne, in the department of the Jura, on April 27 last. She was taken to M. Pasteur's laboratory nine days after. During the fifteen days she remained in Paris she went through the usual inoculations, with ten bouillons of progressive strength; after which she was declared cured and sent back to her family. On June 13 the girl presented the first symptoms of hydrophobia, and refused all nourishment. She afterward presented all the other symptoms, and died on June 17, in a fit of extreme violence.

And still another patient of M. Pasteur's is reported to have just died. The patient was a Russian woman who was bitten by a wolf, and, after having undergone the usual inoculations at the laboratory, returned to her home, where she soon after succumbed to hydrophobia. This death is the fourteenth out of fifty-four persons bitten by wolves, which would give an average mortality of twenty-six per cent., which is about the average given in recent statistics of deaths from the bites of wolves.

Intelligence has just been received from St. Petersburg to the following effect: On the 3d and 4th of May last, seven persons (five children and two women) were bitten by a mad dog in the district. They were immediately sent to Paris under the care of Dr. Winow, to be treated according to Pasteur's method. Of the seven patients, three have died since their return to Russia.

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MUMMY OF RAMESES II.

One of the most remarkable and interesting events pertaining to Egyptology was the recent unrolling of the mummy of the ancient monarch, Rameses II., the Pharaoh of the Bible under whose reign the flight of the Jews led by Moses occurred.

The unrolling took place at Boulak, June 3, 1886, under the direction of Prof. Maspero, Director-General of the Excavations and Antiquities of Egypt, by order and in presence of the Khedive of Egypt, and a large company of officials and learned men from various countries.

From the official report of Prof. Maspero we take the following:

MM. Gaston Maspero, Director-General of the Excavations and Antiquities of Egypt, Emil Brugsch Bey, keeper, and Urbin Bouriant, assistant keeper, of the Museum of Boulak, proceeded, in the hall called "The Hall of Royal Mummies," to unbandage those two mummies which, in the printed catalogue, are numbered 5,229 and 5,233, both being among those discovered in the subterraneous hiding place at Dayr-el-Bahari.

The mummy (No. 5,233) first taken out from its glass case is that of Rameses II., Sesostris, as testified by the official entries bearing date the 6th and 16th years of the reign of the High Priest Her-hor Se-Amen and the High Priest Pinotem I., written in black ink upon the lid of the wooden mummy case, and the further entry of the 16th year of the High Priest Pinotem I., written upon the outer winding sheet of the mummy over the region of the breast. The presence of this last inscription having been verified by His Highness the Khedive, and by the illustrious personages there assembled, the first wrapping was removed, and there were successively discovered a band of stuff 20 centimeters in width rolled round the body; then a second winding sheet sewn up and kept in place by narrow bands placed at some distance apart; then two thicknesses of small bandages; and then a piece of fine linen reaching from the head to the feet. A figure representing the Goddess Nut, one meter in length, is drawn upon this piece of linen, in red and white, as prescribed by the ritual. The profile of the goddess is unmistakably designed after the pure and delicate profile of Seti I., as he is known to us in the bass-relief sculptures of Thebes and Abydos. Under this amulet there was found another bandage; then a layer of pieces of linen folded in squares and spotted with the bituminous matter used by the embalmers. This last covering removed, Rameses II. appeared. The head is long, and small in proportion to the body. The top of the skull is quite bare. On the temples there are a few sparse hairs, but at the poll the hair is quite thick, forming smooth, straight locks about five centimeters in length.

White at the time of death, they have been dyed a light yellow by the spices used in embalment. The forehead is low and narrow; the brow-ridge prominent; the eyebrows are thick and white; the eyes are small and close together; the nose is long, thin, hooked like the noses of the Bourbons, and slightly crushed at the tip by the pressure of the bandages. The temples are sunken; the cheekbones very prominent; the ears round, standing far out from the head, and pierced like those of a woman for the wearing of earrings. The jawbone is massive and strong; the chin very prominent; the mouth small, but thick lipped, and full of some kind of black paste. This paste being partly cut away with the scissors, disclosed some much worn and very brittle teeth, which, moreover, are white and well preserved. The mustache and beard are thin. They seem to have been kept shaven during life, but were probably allowed to grow during the king's last illness, or they may have grown after death. The hairs are white, like those of the head and eyebrows, but are harsh and bristly, and from two to three millimeters in length. The skin is of earthy brown, splotched with black. Finally, it may be said the face of the mummy gives a fair idea of the face of the living king. The expression is unintellectual, perhaps slightly animal; but even under the somewhat grotesque disguise of mummification, there is plainly to be seen an air of sovereign majesty, of resolve, and of pride. The rest of the body is as well preserved as the head; but in consequence of the reduction of the tissues, its external aspect is less life-like. The neck is no thicker than the vertebral column. The chest is broad; the shoulders are square; the arms are crossed upon the breast; the hands are small and dyed with henna; and the wound in the left side through which the embalmers extracted the viscera is large and open.

The legs and thighs are fleshless; the feet are long, slender, somewhat flat soled, and dyed, like the hands, with henna. The corpse is that of an old man, but of a vigorous and robust old man. We know, indeed, that Rameses II. reigned for 67 years, and that he must have been nearly 100 years old when he died.

MUMMY OF RAMESES II.—3,200 YEARS OLD.

The Ignition of Coal Dust.

According to the results of some experiments on the ignition of coal dust and fire damp, which have been published by Mr. C. Hitt in the *Revue des Mines*, coals containing from 16 to 24 per cent of volatile matter appear more dangerous than either richer or poorer qualities. The ignition of coal dust may be induced by an explosion of fire damp as well as by a blast; and the explosion may be occasioned on firing a blast by electricity as well as by a safety match or a port fire. With dynamite there is less danger; and with guncotton dissolved in nitro glycerine, practically none, if it is ignited by a cap of sufficient force.

A Mountain Railway.

Messrs. D. H. & G. Haggie, Wearmouth Rope Works, Sunderland, are manufacturing two long ropes for a tramway which is in course of construction at Hong Kong, from the town up to "The Peak," a range of very steep hills, on which are many very fine villa residences, and where the climate is better than at the low level by the harbor. The incline where the ropes have to work is 4,800 feet long, laid with 35 lb. steel rails on steel sleepers, the line being partly single and partly double; the gradients varying between 1 in 2 and 1 in 10, following closely the natural contour of the ground. The total height the carriages have to be raised is 1,300 feet. The ropes run on separate sets of friction rollers, the one a working rope and the other a safety rope. The carriages are attached to each end of the ropes, and as one pair of carriages ascends the incline, the other pair descends. Each car is to contain sixty passengers, the maximum load being 7½ tons at each end of the ropes. The working rope is passed over a pair of drums, 8 ft. in diameter, and the safety rope over one drum, the drums being fixed at the top of the incline and driven by two compound steam engines, 40 nominal horse power each. The speed of the cars is to be six miles an hour.

Cast Iron Girders.

The use of simple cast iron girders for bridges appears to be limited only by the power to make sound castings (which arises chiefly from the difficulty of pouring the metal equally and the inconvenience of handling large masses). Mr. Rastrick, however, would not put any limit to the length. Mr. Hawkshaw considers that they may safely be made more than 50 feet long; in which opinion Mr. Fox and Mr. Grissell concur, but name 60 feet as the limit. Mr. Glynn, Mr. Charles May, and Mr. Joseph Cubitt would make them from forty to fifty feet. Mr. P. W. Barlow, Mr. Fairbairn, Mr. W. H. Barlow, and Mr. Stephenson state forty feet as the limit; and Mr. Brunel names 35 feet, as he does not consider that sound castings can be insured to a greater length. Mr. Fairbairn, however, mentions a girder in Holland 70 feet long cast in one piece. It appears to be universally admitted that the form resulting from Mr. Hodgkinson's experiments on the tension and compression of iron is that which gives the greatest strength; but the actual proportions are generally modified to suit the varying circumstances under which girders are employed. Mr. Stephenson sometimes makes the top flange equal to the bottom one, but usually in the proportion of 3:5, partly to obviate any risk from unequal cooling of the materials, and partly from the necessity of having a large top flange to bolt the flooring to. In preference to using a single girder, Mr. Stephenson recommends two girders to be bolted together, with a balk of timber between, to which the rail is fixed. Mr. Hawkshaw, Mr. Fox, and Mr. Joseph Cubitt recommend that the top flange be increased beyond the proportions given by Mr. Hodgkinson, in order to resist the lateral torsion. Mr. W. H. Barlow and Mr. Locke would use the arched form of girder whenever practicable, and the former gentleman says that straight girders have been in fashion, and consequently more used than practice actually required. Mr. Fox, in girders subject to dead weight only, would make the proportion of the top flange to the bottom one as 1:6, but in railway bridges he recommends 1:4. Mr. Thomas Cubitt mentions that shoes, or sockets, or any projections cast on girders, have a tendency to create flaws from causing the dirt to accumulate in those places, and he considers that the shape which will insure a sound casting should be as much considered as the theoretical form of greatest strength.

COMPOSITE photography has been applied by Dr. Persifor Frazer to the testing of signatures. Though his experiments cannot yet be said to ensure absolute certainty in discriminating true from forged writing, it is considered that one great point, at least, has been gained, "in the fact that it removes the judgment . . . from the possible bias of personal expert opinion, and allows the testimony of the photograph to be weighed by judge and jury like any other testimony."

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PROPOSED FIRE ENGINE ELEVATORS FOR USE IN THE NEW YORK ENGINE HOUSES.

For some years the necessity of increasing the number of engines that could be called upon for the extinction of fires has been realized forcibly by the Fire Department of this city. Their power of doing this has been restricted by unfavorable conditions. The districts where increased force is most needed are crowded with houses, and property is held at a very high valuation. For each engine company a building 25 feet in front and of full depth is required. The department has not felt able to purchase new lots enough to carry out their desires.

Some years ago Mr. Henry D. Purroy, now president of the board, conceived the idea that by utilizing the cellars of engine houses the capacity of each might be doubled. At present the cellars represent little more than waste space. They contain a small heating apparatus, and the great part of their area, equal to that of the working floor, is useless. He proposed to introduce elevators that should be sufficiently powerful to raise and lower an engine or tender, or other apparatus, from floor to floor. If this idea were successfully carried out, there would be ample room for a second relay of men and horses on the upper floors, the extra apparatus would be stored in the cellar, and the working floor would be as unobstructed as it now is.

In the illustration we present Commissioner Purroy's idea in some detail. Sections of the cellar and working floor are made movable, and are connected by heavy stanchions, so as to preserve an invariable distance from each other. When the lower platform, sinking into a depression in the cellar floor, comes to a level therewith, the upper platform is flush with the working floor. Four guide posts run from cellar floor to the ceiling of the ground story. Upon the lower platform an extra engine or tender is placed. After the regular engine has been called out, the platforms are raised until the lower one is even with the working floor. By any simple locking device which may be automatic, the platform is caught and secured in this position. The second apparatus is then ready to answer a second alarm. Our illustration shows the elevator rising as the regular engine is leaving for a fire.

By counterpoising, the weight to be raised may be almost nothing. An engine represents some 10,000 lb. While this seems a large weight, it is an invariable one, and the elevator may be counterpoised within a few pounds of its load, and might even be overbalanced, so that the platform, on a catch being released, would rise automatically. For such lifting power as may be required, it was thought that a gas engine might be used.

The length of the stanchions should be so adjusted that the upper platform would strike the ceiling above or striking pieces attached thereto, and lock itself there as the lower one came to its place. This feature was included in the original idea, and appears a very good one.

With regard to the location of the elevator, it may be in the front or rear. If in the front, then its upper platform would always carry the regular engine. If in the rear, the upper platform would be unoccupied, and would count as floor space. As the lower engine rose, it could be run forward by man power or the horses could be harnessed as it stood.

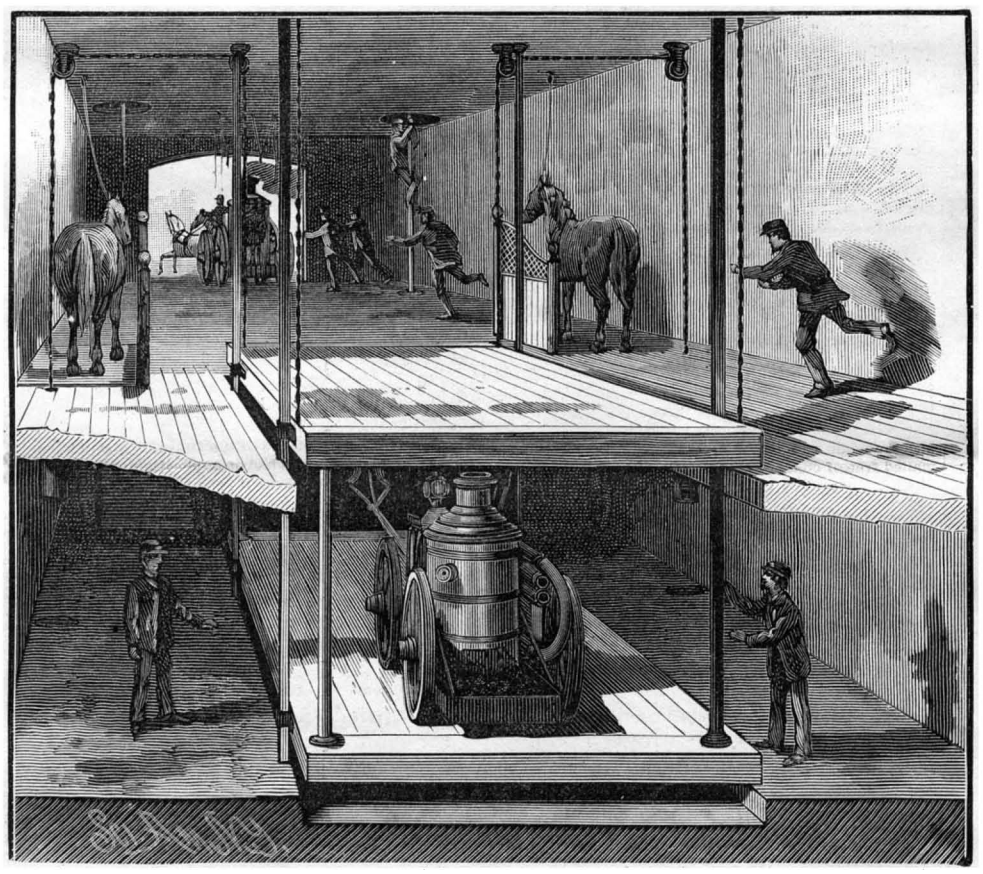
By having it of sufficient length, the extra engine could be carried up with its pole in place and the harness hanging from the snap hooks on the lower surface of the upper platform. On the other hand, as it takes but a moment to place the pole in its socket, the smaller elevator may be adopted.

The widest range for application of power and other details is still open. A direct or indirect hydraulic lift may be employed, or a windlass worked by some form of power would answer. The lower engine need not be kept upon the platform, but may be stored in front or rear of it, and be run on when the upper one goes out. To guide it between the stanchions and guide posts, Commissioner Purroy has proposed the use of rails on the platform, similar to those used on street railways.

The double platform elevator counterpoised is substantially the original idea, and presents, to our mind, very great advantages. Plans have been prepared by Messrs. N. Le Brun & Son, architects to the department, which involve the use of a single platform elevator, worked by hydraulic power. When the first engine has gone out, the elevator, whose platform has hitherto formed part of the working floor, is lowered to the cellar, receives its engine or other apparatus, and rises with it to the upper level. Such elevator may be worked by a short cylinder directly under it or by an indirect acting cylinder, such as is in use on most elevators.

For cities of a more regular shape than New York, this plan can be worked to even greater advantage. Three or four houses can be made to cover a large area if worked upon this plan. While it seems a peculiar merit of the method that it can be applied to old houses, the department, not wishing to risk a failure, have preferred to wait until a new house was to be built to test its merits. This is now soon to be done, and it promises to offer a satisfactory solution of a very troublesome problem.

The double platform elevator presents the advantage that the floor is always complete save as the lower engine is coming up. On the other hand, the single platform arrangement does away with the obstructing stanchions and guide posts. Each system, in other words, has its own advantages.



FIRE ENGINE ELEVATOR.

PHOTOGRAPHIC NOTES.

Improving Gelatine Emulsions.—Before the first annual Convention of Photographers of Great Britain, recently held at Derby, Mr. A. L. Henderson, well known for his exhaustive experiments in gelatine emulsions, spoke upon the advances which are being made in this direction. By means of the centrifugal machine he had, with one or two exceptions, remedied every spoiled emulsion that had been brought to him, and in those cases he believed the emulsions had been fogged by light.

He regrets that photographers, as a general rule, are so reticent and uncommunicative about any improvements they may discover. If there were fewer so-called trade secrets, photography, as an art science, would make much more rapid strides. He says:

Through this new departure, *i. e.*, using a centrifugal separator, I have gained more knowledge in six months than the whole previous year's experiments. By the complete removal of the colloid matter and soluble salts, I am enabled to examine the finely divided bromide, and then add other substances that I venture to think will still more revolutionize photography. I particularly allude to the addition of what may be called accelerators (physical or chemical) to emulsion. If an emulsion, being perfectly free from soluble matter, is boiled for a time, it will darken in color. The same emulsion might have been boiled as long in the presence of free bromide and nitrates without darkening. If in the former case I add some nitrate that will dissolve oxide of siver, and add some free bromide, I decolorize the emulsion, but I will not altogether eliminate fog, for this reason: the free silver (*i. e.*, I will call it free silver for argument's sake) has acted on the colloid before the addition of the free bromide, which has to play the part of reconversion, but, as I have previously stated, if both the nitrates and free bromide is present from the first, no chemical fog will result.

Some few years ago, Professor Stebbing published "that a washed bromide of silver coarsely precipitated, when boiled with the addition of free bromide, a breaking up of the granules took place." I tried this at the time without noticing this effect, but on my adding some gelatine a rapid breaking was the result, and I found that this occurred without the free bromide. It is very evident that the addition of fresh gelatine to a finished emulsion will frequently accelerate and sometimes slow it. Accelerate if the gelatine is neutral, and restrain or slow if it is acid. I have discovered that a finished emulsion may be ripened considerably by keeping it liquid, with the addition of a very small quantity of pure nitrate of potassium and bromide of potassium. My reason for suggesting potassium salts is that they are less deliquescent, and no harm will come over the plates prepared without the removal of the salts. The quantity must not be so large as to give any appearance of crystallization when the plates are dry. The larger the quantity, the finer is the emulsion in density, speed, and clearness of shadows. I generally add to every ounce of gelatine five grains of potassium nitrate and two of bromide. Here are two plates. You will see the effect; not only does the speed increase, but, strange to say, the density also. Both these plates have had the same exposure under the sensitometer tablet. I calculate the speed has been increased nearly four times. I am not quite sure if my explanation is correct, but it looks as if the very partial crystallization allows more light to penetrate the film and perhaps absorb certain rays less actinic. I think this idea will open a wide field of research, namely, that crystalline matter introduced in emulsion may take the place of the various substances recommended to give orthochromatic or isochromatic effects.

Here is another curious result occasioned by the mixture of a very rapid and a slower emulsion. You will see that the plate is covered with black spots. At first I thought that some impurity had got into the emulsion, but on close examination it will be seen that where there is no exposure, the black spots do not exist, showing that the black spots are silver compounds. The addition of nitrate of potassium and bromide caused a breaking up and possibly dissolving of the more sensitive particles (these particles are so fine that they have passed through a chamois leather filter). This will explain why an emulsion is more homogeneous and better for being set and remelted. I called attention to the fact some years ago that setting and remelting several times improved the quality of emulsion, although at the time I was not sure of the reason. I see that Mr. Plener has given it as his opinion that a putrid emulsion that frilled could not be cured by the removal of the decomposed gelatine. I differ with Mr. Plener in this matter. Mr. Plener, doubtless, made this statement, believing that frilling was produced only from decomposed gelatine. The most common cause of frilling is the subsidence of the silver bromide to the glass from slow setting. An emulsion that has become sloppy is usually coarser. I believe that Mr. Plener is, to a certain extent, correct regarding the re-emulsifying of the bromide after being passed through the separator. The addition of acids to the bromide of silver will remove all the gelatine, and, in fact, will permit the bromide to be washed in alcohol, and added to vehicles other than gelatine. If the gelatine is not perfectly removed, the granules of silver bromide will harden under the alcoholic treatment, and be useless for mixing with collodion; but they soften in water again, and are easily miscible in gelatine.

One word more regarding the keeping qualities of emulsion containing nitrates and bromide. The antiseptic properties of nitrate of potassium are well known to picklers of meat. I have some emulsion put away to test the keeping qualities. I am in hopes that at the next convention I may be able to show this emulsion, and tell you something more of its properties.

We have taken the foregoing extracts from the *British Journal of Photography.*

American Institute Fair, New York.

The 55th annual fair of the American Institute will be opened in the city of New York on the 29th of September, 1886. The building is now being put in order. The fountain in the center of the main building will be in operation this year, and will be illuminated by Edison electrical lights. There will be an unusual display of fine engines and labor-saving machinery of all kinds. The horticultural display will commence on the 6th of October.

RECENT determinations give light a velocity of 185,420 miles per second (Cornu), or 186,380 miles per second (Michelson).

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ENGINEERING INVENTIONS.

A railroad switch has been patented by Messrs. George Bennett, George Dike, and William W. Rich, of Lincoln, Neb. This invention relates to the class of triple or "three-throw" switches, and has but a single spring, being extremely simple and comparatively cheap, while embracing novel features, which assure easy working with little chance of derangement.

MISCELLANEOUS INVENTIONS.

A combined ice pick, chisel, and mallet has been patented by Mr. Henry M. Dixon, of New York city. The invention consists in the construction and combination of the various parts of the implement, so that it can be conveniently used in either capacity.

A snap hook has been patented by Mr. George A. Shamberger, of Mound City, Mo. It has a swinging tongue, with notch and arm, in combination with a pawl, and with a thumb piece and spring, and is so made that the tongue cannot be pressed open except by the action of the operator, the tongue, when left free, seating itself and becoming locked.

A hand grenade has been patented by Messrs. Charles W. Fowler and Edward H. Shelman, of Brandenburg, Ky. It is for fire extinguishing purposes, and is adapted to receive a detachable handle, and a handle for holding and applying it for use, so that it may be carried to otherwise inaccessible points, and there broken.

An abdominal bandage has been patented by Messrs. Wilhelm and Julius Teufel, of Stuttgart, Germany. It has an elastic lock girth attached to the front part of an abdominal belt, and the bandage may be closed at the sides of the body instead of the back or front, with various novel features to adapt it for effective use for various maladies.

A scythe fastening has been patented by Messrs. Henry B. Robertson and Charles Danker, of Havensville, Kan. It consists of a snath iron attached to the handle and provided with a wedge shaped opening of a square scythe heel, with set screws to fasten and adjust the scythe blade to the snath iron, by which the operator can adjust the scythe to any desired angle.

An illuminated clock hand and dial has been patented by Mr. Alfred Speer, of Passaic, N. J. Combined with each of the hands of the clock is a series of lights to be carried by the hands, together with reflectors, arranged to throw the light outward from the hands, in such way that the position of the hands may be accurately located at a long distance from the clock.

A feed bag for animals has been patented by Mr. Franklin P. Eastman, of New York city. It has an outer compartment for holding and feeding the grain to a central or inner compartment that receives the animal's nose, the arrangement being such that the central part can never be more than partly full of grain, and the animal will have plenty of breathing space.

A miner's candlestick has been patented by Mr. Thomas Cox, of Gloster, Montana Ter. This invention covers improvements on a former patented invention of the same inventor, bettering the mechanism for preventing the candle from slipping out of its holder; the candlestick has a bar with pointed end, which may be thrust into the heading, or a hook by means of which it may be suspended when desired.

A die for lead presses has been patented by Mr. John Hooper, of New York city. The die plates are adjustable, being offset at their meeting edges to form, when placed together, a narrow slot, whose length may be increased or diminished by sliding the die plates in opposite directions in the bed plate, so that sheets of lead of different widths may be made with the same set of die plates or keys.

A cylinder printing machine has been patented by Mr. Jacob C. Rairigh, of Brockwayville, Pa. It has a traveling cylinder arranged to roll over the frame and carry the paper over the type supported by the bed, together with novel means for inking and distributing the ink, for operating the paper nippers, and for lowering the bed on the return movement of the cylinder, and raising it afterward.

A motor has been patented by Mr. Isaac St. Clair Goldman, of Pasadena, Cal. It consists of two endless traveling chains or belts and a power wheel held loosely in and engaging both, and adapted to rise and fall in and between the chains or belts, whereby the power transmitted to one belt by a prime mover will be transmitted through the wheel and the other belt to a driving mechanism.

A wrench has been patented by Mr. Willis H. Bradley, of Rockford, Ill. It is so made as to be readily adjustable for either a large or small nut, and after the nuts have been removed from the axle they will be retained within the recess of the wrench, so that the whole device may be laid upon the floor or ground without bringing the nut in contact with sand or grit.

A collar or cuff button or stud has been patented by Mr. Read Benedict, of West New Brighton, N. Y. It is a button with a shank formed with outwardly inclined sides or edges near the head of the button to spread the button hole, so the head of the button may be easily slipped out, the shank being made flat to permit the button hole to close under the head of the button, with other novel features.

A cultivator bar and cultivator clip has been patented by Messrs. William Zehner and Martin A. Eisenhour, of Plymouth, Ind. The bar is detachable and adjustable, with the clips holding the cultivator teeth bolted to the upper side of the bar and in the line of draught; a universal clip is produced adapted to suit various forms of spring teeth, spike teeth, and cultivator teeth, and it may be secured to either side of the bar.

A window washing machine has been patented by Mr. Richard H. Schenck, of New York city. Connected with a standard adapted to be fitted to a raised sash is a combination lever which holds a head block in such way that it can be brought to any desired position against the outside of a window, and raised or lowered by a cord passing to the hand of the operator, to facilitate cleaning the outside of windows from within an apartment.

A metal faced fabric or material for interior decorations has been patented by Messrs. Theophilus and James Millot, of New York city. It is made by precipitating upon a previously prepared glass plate a thin sheet of metal, then applying a thin coating of glue, gelatine, or other sticky substance on the metal or on the material to which the transfer is to be made, in such way that the thin film of metal can readily be stripped off upon the article or fabric to be coated.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Metallic Pattern Letters and Figures to put on patterns of castings. Knight & Son, Seneca Falls, N. Y.

Catarrh Cured.

A clergyman, after years of suffering from that loathsome disease, catarrh, and vainly trying every known remedy, at last found a prescription which completely cured and saved him from death. Any sufferer from this dreadful disease sending a self-addressed stamped envelope to Dr. Lawrence, 212 East 9th St., New York, will receive the recipe free of charge.

Fine 10 in. Telescope, $125. Tydeman, Camden, N. J.

A European house wants to acquire the patent of a quilting machine making bed quilts, in plain and fancy patterns. Address offers A. B., P. O. box 773, New York.

Inventors of Buttons and Button Machinery, address Geo. E. Weaver, Providence, R. I.

Manufacturers of specialties in the machinery line, wishing to enlarge, can learn of fine opportunity by addressing P. O. drawer 1150, Providence, R. I.

"Better die soon
Than live on lingeringly in pain."

Better do neither, but get and take medicine that will relieve pain, which is only an evidence of disease, and thus you may live on in health and happiness. If you have a cold or cough, weak or sore lungs, consumption, chronic nasal catarrh, bronchitis, impure blood, or liver disease, take Dr. Pierce's "Golden Medical Discovery"—a certain cure for these diseases. By druggists.

Wanted—Situation as Draughtsman and Patternmaker; twenty years' experience on agricultural machinery. M. J., P. O. box 773, New York.

Concrete Apparatus, etc. Ernest Ransome, S. F., Cal.

Engines, B'l's, all sizes. Lock Box J, So. Windham, Ct.

The Knowles Steam Pump Works, 44 Washington St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

A Catechism on the Locomotive. By M. N. Forney. With 19 plates, 227 engravings, and 600 pages. $2.50. Sent on receipt of the price by Munn & Co., 361 Broadway, New York.

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Curtis Pressure Regulator and Steam Trap. See p. 142.

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See Burnham's turbine ad. to mill owners next week.

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Hoisting Engines. D. Frisbie & Co., New York city.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N.Y. See illus. adv., p. 28.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN patent agency, 361 Broadway, New York.

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Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(1) W. H. K. asks: How many pounds pressure to a square inch is required to compress two cubic inches of air (at the sea level) into one cubic inch? A. A pressure of fifteen pounds to the square inch in addition to the atmospheric pressure.

(2) S. K. M. asks: 1. How many Grenet battery cells, each having two carbon plates exposing a surface 3 by 1 inch, and one zinc of the same size, will work two gallons of nickel plating solution? A. Half a dozen such batteries should give fair results. 2. About what proportion, by weight, of nickel salts will water at 60° Fah. dissolve? A. Use for plating 10 parts by weight of distilled water and 1 part by weight of double sulphate of nickel and ammonium. 3. Can nickel plating be done easily and well by amateurs? A. It is far from easy for an amateur to nickel plate satisfactorily. We recommend as text-book, Electrolysis, by Fontaine, which we can send for $3.50.

(3) J. B. A. asks: 1. If a rifle ball is discharged perpendicularly, will the ball descend to the earth with the same force that it had when it left the gun? A. It will not, owing to the resistance of the air. 2. If a body is dropped from a very great distance (say from a balloon), is there no limit to the velocity of the body? Is it not possible for it to drop so very fast that the resistance of the air prevents it going any faster? A. If the body did not burst into fragments or become otherwise destroyed, there is a maximum of velocity that it could not exceed.

TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

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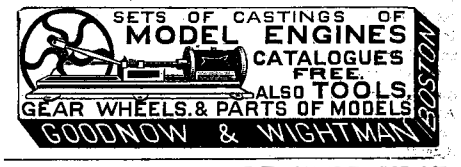

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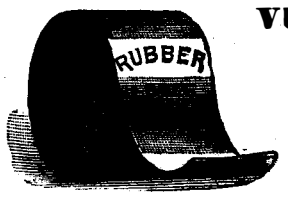

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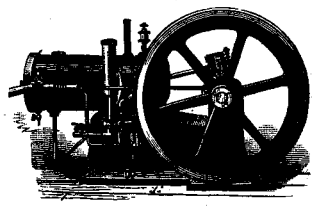

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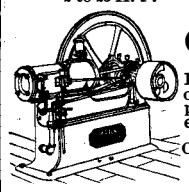

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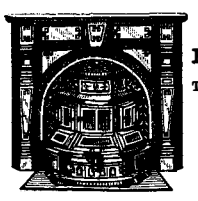

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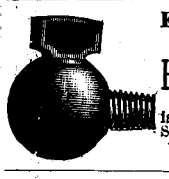

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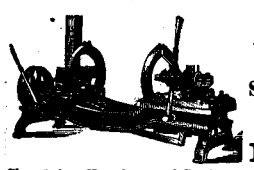
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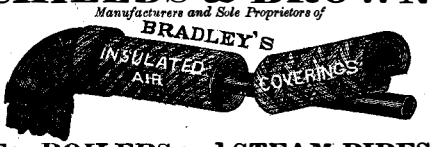

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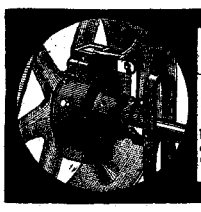

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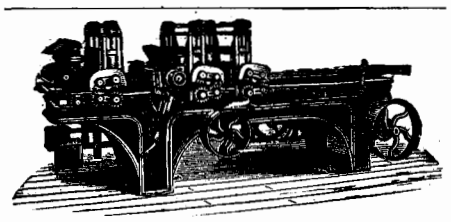

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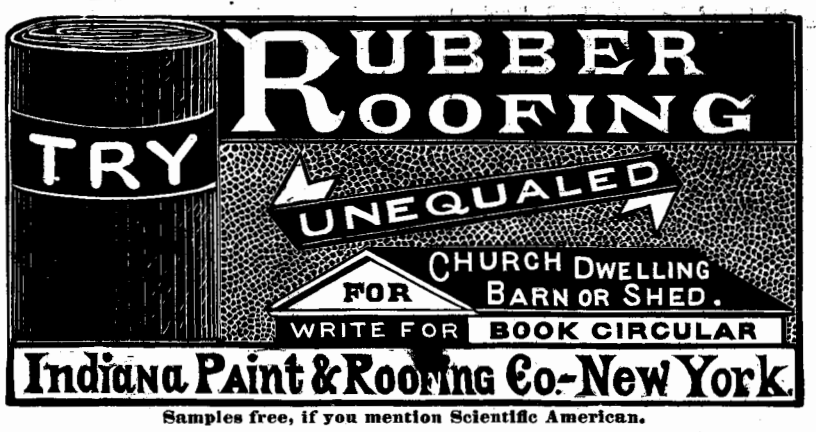

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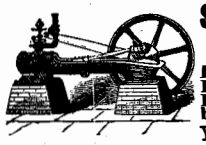

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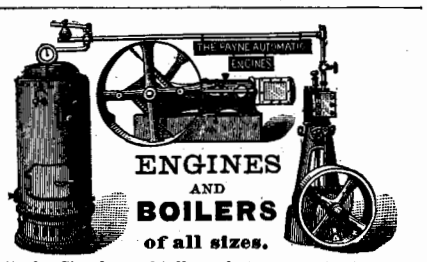

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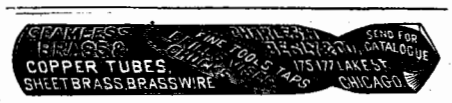

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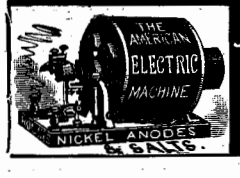

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